WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT

# PINE RIVER WATERSHED

Richland and Vernon Counties, Wisconsin

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

May 1976

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

PART I - WATERSHED PLAN

PINE RIVER WATERSHED

RICHLAND AND VERNON COUNTIES, WISCONSIN

Prepared Under the Authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress, 68 Stat. 666), as amended, and in accordance with the National Environmental Policy Act of 1969, Section 102 (2) (c) Public Law 91-190

Prepared Under the Direction of
Richland and Vernon County Soil and Water Conservation Districts

With Assistance By
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Agriculture, Forest Service



MAY 1976

PART II - FINAL ENVIRONMENTAL IMPACT STATEMENT (cont.)

WATERSHED PLAN AGREEMENT

between the

Richland County and Vernon County
Soil and Water Conservation Districts
(hereinafter referred to as the Sponsoring Local Organization)

State of Wisconsin

and the

Soil Conservation Service
United States Department of Agriculture
(hereinafter referred to as the Service)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsoring Local Organization for assistance in preparing a plan for works of improvement for the Pine River watershed, State of Wisconsin, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress; 68 Stat. 666), as amended; and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Service; and

Whereas, there has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service a mutually satisfactory plan for works of improvement for the Pine River watershed, State of Wisconsin, hereinafter referred to as the watershed plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Sponsoring Local Organization and the Secretary of Agriculture, through the Service, hereby agree on the watershed plan, and further agree that the works of improvement as set forth in said plan can be installed in about 8 years.

It is mutually agreed that in installing and operating and maintaining the works of improvement substantially in accordance with the terms, conditions, and stipulations provided for in the watershed plan:

1. The Sponsoring Local Organization will acquire such land rights as will be needed in connection with the works of improvement. The percentages of this cost to be borne by the Sponsoring Local Organization and the Service are as follows:

| Works of Improvement | Sponsoring Local Organization (percent) | Service (percent) | Estimated Land Rights Cost (dollars) |
|---|---|---|---|
| Multiple-purpose str. No. 2 and recreational facilities | | | |
| Payment to landowners for about 213 acres | 50 | 50 | 83,600 |
| Cost of alteration or modification of improvements * | 100 | 0 | 1,000 |
| Legal fees, survey costs, flowage easements, and other | 100 | 0 | 800 |
| Multiple-purpose str. No. 36 and recreational facilities | | | |
| Payment to landowners for about 1,925 acres | 50 | 50 | 745,400 |
| Cost of alteration or modification of improvement * | 100 | 0 | 80,400 |
| Legal fees, survey costs, flowage easements, and other | 100 | 0 | 1,600 |
| Trout stream improvement | 100 | 0 | 30,000 |
| Floodwater retarding structures, dikes and outlet system | 100 | 0 | 1,102,700 |

*Including necessary engineering services, construction, and additional land costs.

The Sponsoring Local Organization agrees that all land acquired or improved with Public Law 566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the operation and maintenance agreement.

2. The Sponsoring Local Organization assures that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsoring Local Organization and the Service as follows:

| Sponsoring Local Organization (percent) | Service (percent) | Estimated Relocation Payment Costs (dollars) |
|---|---|---|
| 41.0 | 59.0 | 92,200 |

3. The Sponsoring Local Organization will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State law as may be needed in the installation and operation of the works of improvement.

4. The percentages of construction costs of structural measures to be paid by the Sponsoring Local Organization and by the Service are as follows:

| Works of Improvement | Sponsoring Local Organization (percent) | Service (percent) | Estimated Construction Cost (dollars) |
|---|---|---|---|
| Single-purpose floodwater retarding structures | 0 | 100.0 | 3,531,000 |
| Multiple-purpose structure No. 2 | 27.4 | 72.6 | 665,300 |
| Specific | 50.0 | 50.0 | 51,000 |
| Recreational facilities | 50.0 | 50.0 | 179,800 |
| Multiple-purpose structure No. 36 | 21.9 | 78.1 | 1,968,000 |
| Specific | 50.0 | 50.0 | 124,200 |
| Recreational facilities | 50.0 | 50.0 | 417,000 |
| Trout stream improvement | 50.0 | 50.0 | 30,000 |
| Dikes and outlet system | 0 | 100.0 | 687,600 |

5. The percentages of the engineering costs to be borne by the Sponsoring Local Organization and the Service are as follows:

| Works of Improvement | Sponsoring Local Organization (percent) | Service (percent) | Estimated Engineering Cost (dollars) |
|---|---|---|---|
| Single-purpose floodwater retarding structures | 0 | 100.0 | 340,300 |
| Multiple-purpose structure No. 2 | 0.0 | 100.0 | 53,200 |
| Specific | 0.0 | 100.0 | 5,300 |
| Recreational facilities | 50.0 | 50.0 | 15,000 |
| Multiple-purpose structure No. 36 | 0.0 | 100.0 | 157,500 |
| Specific | 0.0 | 100.0 | 11,900 |
| Recreational facilities | 50.0 | 50.0 | 35,000 |
| Trout stream improvement | 100.0 | 0 | 3,000 |
| Dikes and outlet system | 0 | 100.0 | 68,800 |

6. The Sponsoring Local Organization and the Service will each bear the costs of Project Administration which it incurs, estimated to be $140,000 and $1,064,500 respectively.

7. The Sponsoring Local Organization will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.

8. The Sponsoring Local Organization will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.

9. The Sponsoring Local Organization and the Service will share in the installation costs of the critical area stabilization. Construction costs will be borne 25 percent by the Sponsoring Local Organization and 75 percent by the Service. Technical assistance will be provided by the Service. The Sponsoring Local Organization will acquire all land rights needed to assure the installation and maintenance of the critical stabilization measures.

10. The Sponsoring Local Organization will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed. The Sponsoring Local Organization will be responsible for the operation and maintenance of the special critical area stabilization measures installed under the land treatment program.

11. The Sponsoring Local Organization will be responsible for the operation and maintenance of the structural works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.

12. The costs shown in this agreement represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.

13. This agreement is not a fund obligating document. Financial and other assistance to be furnished by the Service in carrying out the watershed plan is contingent on the appropriation of funds for this purpose.

    A separate agreement will be entered into between the Service and the Sponsoring Local Organization before either party initiates work involving funds of the other party. Such agreement will set forth in detail the financial and working arrangement and other conditions that are applicable to the specific works of improvement.

14. The watershed plan may be amended or revised, and this agreement may be modified or terminated only by mutual agreement of the parties hereto except for cause. The Service may terminate financial and other assistance in whole, or in part, at any time whenever it is determined that the Sponsoring Local Organization has failed to comply with the conditions of this agreement. The Service shall promptly notify the Sponsoring Local Organization in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsoring Local Organization or recoveries by the Service under projects terminated for cause shall be in accord with the legal rights and liabilities of the parties.

15. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

16. The program conducted will be in compliance with all the requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7 C.F.R. 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activity receiving Federal financial assistance.

17. This agreement will not become effective until the Service has issued a notification of approval and authorizes assistance.

Richland County Soil and
Water Conservation District
Courthouse
Richland Center, Wisconsin 53581

By Wm J Louis

Title Chairman

Date May 25, 1976

The signing of this agreement was authorized by a resolution of the governing body of the Richland County Soil and Water Conservation District adopted at a meeting held on the 25th day of May, 1976 .

Willard Rehm

Secretary, Richland County
Soil and Water Conservation
District

R.R.1 Lone Rock, Wisconsin 53556
Address Zip Code

Date May 25, 1976

Vernon County Soil and
Water Conservation District
Courthouse
Viroqua, Wisconsin 54665

By Edwin Swenson
Edwin Swenson
Title Chairman
Date May 25, 1976

The signing of this agreement was authorized by a resolution of the governing body of the Vernon County Soil and Water Conservation District adopted at a meeting held on May 25, 1976.

George E. Nettum
Secretary, Vernon County
Soil and Water Conservation
District

Viroqua, Wis. 54665
Address Zip Code

Date May 25, 1976

Appropriate and careful consideration has been given to the environmental impact statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

State Conservationist

5-27-76
Date

WATERSHED PLAN

PINE RIVER WATERSHED

Richland and Vernon Counties, Wisconsin

May 1976

## SUMMARY OF PLAN

This watershed plan has been developed to provide for watershed protection, flood prevention, public recreational development, and fish and wildlife improvement in the Pine River watershed, Richland and Vernon Counties, Wisconsin.

The Richland and Vernon County Soil and Water Conservation Districts (SWCD's), the local sponsoring organization, directed the preparation of this plan with the help of the Pine River Watershed Association. Technical assistance for developing the plan was provided by the Soil Conservation Service (SCS) and the Forest Service (FS) of the U.S. Department of Agriculture. Other contributing agencies include the Wisconsin Board of Soil and Water Conservation Districts, the Wisconsin Department of Natural Resources (DNR), the University of Wisconsin Extension, and the Fish and Wildlife Service of the U.S. Department of the Interior.

Pine River watershed, located in southwestern Wisconsin, has a drainage area of 159,200 acres or 248.8 square miles. About 27.3 square miles lie in southeastern Vernon County and 221.5 square miles lie in central Richland County.

The watershed is in plan area 3 of the U.S. Department of Agriculture type 4 Wisconsin River basin study. The U.S. Department of Agriculture study approximates the Wisconsin River plan area of the Upper Mississippi River basin.

Frequent and severe flooding of valley bottom lands is the principal problem in the Pine River watershed. Floodwaters have destroyed crops; washed out roads, bridges, and fences; damaged buildings and contents; and deposited debris on cropland and pasture. The city of Richland Center and several small villages located in the flood plain suffer frequent floodwater damage. Trout habitat is damaged by flash floods and deposition of sediment. Public water-based recreational facilities do not adequately meet needs of the area.

Of the 776 farm units in the watershed, 447 are cooperators with the Vernon and Richland County Soil and Water Conservation Districts. Land treatment measures for conservation of soil and water resources and improved land management have been applied with technical assistance from SCS in this watershed since 1940. An accelerated conservation land treatment program is planned to supplement the ongoing soil and water conservation program for watershed protection.

Principal conservation land treatment measures to be applied by individual landowners are agricultural waste management systems, conservation cropping systems, contour farming, critical area planting, diversions, floodwater retarding structures, grade stabilization structures, grassed waterways or outlets, livestock exclusion, logging road and skid trail erosion control, minimum tillage, pasture and hayland management, pasture and hayland planting, streambank protection, stripcropping, supervised harvest cutting, timber stand improvement, tree planting, and wildlife upland habitat management.

Critical area stabilization is to be applied by the sponsoring local organization with Public Law 566 (P.L. 566) cost-sharing to correct serious erosion problems on streambanks and gullied areas. The practices required to correct these problems are streambank protection and grade stabilization structures.

The land treatment and critical area stabilization measures, as applied to cropland, grassland, and forest land, will reduce upland sheet erosion and channel erosion, increase infiltration, and further protect and develop wildlife and fish habitat and forest land resources.

The estimated installation cost of conservation land treatment measures is \$5,249,400, of which \$1,165,700 will be borne by P.L. 566 funds and \$4,083,700 will be borne by other funds.

The proposed structural measures consist of seven single-purpose floodwater retarding structures, two multiple-purpose floodwater retarding and public recreational developments, three dikes and an outlet system, and 4.5 miles of trout stream habitat improvement. The development at multiple-purpose structure (MPS) 2 will have an area of 213 acres including a 50-acre lake. The development at MPS 36 will have an area of 1,925 acres including a 484-acre lake. Recreational facilities are planned to use both land and water resources. The conceptual development plans for recreational facilities are shown in part II, appendix E. The estimated recreational use for both multiple-purpose structures is 142,800 visitor-use days per year. Richland County SWCD intends to purchase an additional 347 acres at MPS 2 and 1,078 acres at MPS 36 for future expansion of facilities and to provide an environmental buffer zone. Location and extent of structural works of improvement are shown on the project map, part II, appendix E.

Estimated installation and administration cost for structural measures is \$11,686,100, of which \$8,835,000 will be borne by P.L. 566 funds and \$2,851,100 will be borne by other funds. Other funds for the proposed structural project measures will be the responsibility of the Richland County Soil and Water Conservation District. The Wisconsin Department of Natural Resources will furnish funds for the trout stream habitat improvement and may provide funds for the public recreational developments.

The installation of all works of improvement, structural and conservation land treatment, will be accomplished during an 8-year period.

The Pine River watershed project will provide flood protection to urban and agricultural lands and transportation facilities. Approximately 9,900 acres of agricultural flood plain and 430 acres of urban land will receive flood protection from the works of improvement.

The estimated average annual cost of the structural works of improvement is $806,600. The average annual benefits accruing from the structural works of improvement are estimated to be $931,800. The benefit-cost ratio for the project is 1.2 to 1.0.

The Richland County Soil and Water Conservation District has formally agreed to accept the responsibility and provide funds for the operation and maintenance of all structural works of improvement. The estimated average annual operation, maintenance, and replacement cost is $91,600, including $78,300 for operation, maintenance, and replacement of recreational facilities.

# INTRODUCTION

Formerly, the watershed plan and environmental impact statement (EIS) were two separate documents. The plan concentrates on the project and its particulars while the EIS concentrates on the impacts or results of the project on the environment.

Since the watershed plan and EIS are combined in one document, the plan has been briefed to avoid excessive duplication of information required in the EIS. Part II should be reviewed for additional information on the planned project, environmental setting, water and related land resource problems, and environmental impacts.

The planned measures include conservation land treatment and structural measures.

Conservation land treatment measures include agricultural waste management systems, conservation cropping systems, contour farming, critical area planting, diversions, floodwater retarding structures, grade stabilization structures, grassed waterways or outlets, livestock exclusion, logging road and skid trail erosion control, minimum tillage, pasture and hayland management, pasture and hayland planting, streambank protection, stripcropping, supervised harvest cutting, timber stand improvement, tree planting, and wildlife upland habitat management. Critical area stabilization includes streambank protection and grade stabilization structures.

The proposed structural measures include nine earthfill dams, three dikes, and an outlet system. Seven of these dams will be single-purpose floodwater retarding structures. Two will be multiple-purpose with permanent pools for recreation as well as flood detention storage. See the project map, part II, appendix E.

All structures are designed to function for 100 years with routine operation and maintenance. For more details on design and storage, see tables 3 and 3A and part II, page 13.

The recreational development area of 213 acres at MPS 2 has a 50-acre lake with a maximum depth of 44 feet. Facilities for swimming, picnicking, camping, hiking, fishing, and boating are planned. See table 2B for details.

The recreational development area of 1,925 acres at MPS 36 has a 484-acre permanent lake with a maximum depth of 45 feet and facilities similar to those at MPS 2. See table 2B for details.

Richland County SWCD also intends to purchase an additional 347 acres at MPS 2 and 1,078 acres at MPS 36 to provide an environmental buffer and to allow for future expansion. Conceptual plans for recreational facilities are shown in part II, appendix E.

A series of three earthfill dikes along the Mill Pond in Richland Center are required to provide the city with 100-year flood protection. See part II, appendix E, figure 4. The dike system has a concrete, vegetal, riprap, and asphalt-lined channel with metal or concrete conduits with flap gates for internal drainage. The system uses gravity drainage, but for certain combinations of local and area storms, pumping will be required and is part of the outlet system. Three stationary low head, high capacity, electrically powered pumps with automatic controls and a similar tractor-powered portable unit are planned.

The existing Mill Pond outlet structure will be operated and maintained in accordance with an agreed upon operation schedule.

Trout stream habitat improvement features will be installed for a distance of 4.5 miles downstream from floodwater retarding structure 21 on Melancthon Creek. Stream improvements will consist of bank cover, boulder retards, stump cover, cattle crossings, spawning areas, rock riprapping, sloping, and seeding.

Land rights are shown in part I on page 14.

The Wisconsin Department of Natural Resources has fishing easements on 6,160 feet of stream that will be inundated by MPS 36. The Department also owns 990 feet of railroad and trail easements. Appropriate road and trail access and 6,160 feet of stream on Melancthon Creek will be acquired to replace the easements lost on Pine River. This acquisition will be completed prior to the commencement of construction on MPS 36.

## INSTALLATION COSTS - MONETARY

Estimated costs of this project are given in tables 1 and 2. The total cost is $16,935,500 of which $5,249,400 is the cost of the ongoing and accelerated conservation land treatment program and $11,686,100 is the cost of structural measures.

### Conservation Land Treatment

The total cost of establishing conservation land treatment measures on cropland, grassland, forest land, and other land during the 8-year installation period is $5,249,400. This includes $1,245,000 for the ongoing program and $4,004,400 for the accelerated program.

Cost of installing ongoing land treatment is $1,123,600 to be borne by landowners who may receive cost sharing through programs of the Agricultural Stabilization and Conservation Service (ASCS) of the U.S. Department of Agriculture. Technical assistance of $121,400 will come from other than P.L. 566 funds.

Accelerated conservation land treatment costs include $450,800 for technical assistance and $3,553,600 for installation. Most of the technical assistance for the accelerated program will come from P.L. 566 funds administered by the Soil Conservation Service and the Forest Service. The Wisconsin Department of Natural Resources will provide $6,700 toward technical assistance for accelerated land treatment on forest lands. The cost of accelerated land treatment measures ($2,591,400) to be applied by individual owners will be paid by the landowners who may receive ASCS cost-sharing assistance. The cost of applying accelerated land treatment measures for critical area stabilization of sediment-producing areas will be shared between P.L. 566 funds ($721,600) and the sponsoring local organization ($240,600).

Cost for installation of conservation land treatment measures on cropland, grassland, forest land, and other land were based on current cost for rental of contract equipment, labor, and materials. Costs of technical assistance in installation of these measures were based on analysis of records. These records were used to determine unit costs for each measure by comparing actual costs to accomplishments. The following table shows P.L. 566 and other fund obligations for accelerated land treatment by years during the installation period. "Other" includes technical assistance and application costs.

Planned Expenditures for Accelerated Land Treatment 1/
Including Critical Area Stabilization
(Dollars)

| Year | Public Law 566 | Other | Total |
|---|---|---|---|
| 1 | 81,600 | 198,700 | 280,300 |
| 2 | 163,300 | 397,400 | 560,700 |
| 3 | 198,200 | 482,700 | 680,900 |
| 4 | 209,800 | 511,100 | 720,900 |
| 5 | 233,200 | 567,700 | 800,900 |
| 6 | 128,200 | 312,300 | 440,500 |
| 7 | 93,200 | 227,000 | 320,200 |
| 8 | 58,200 | 141,800 | 200,000 |
| TOTAL | 1,165,700 | 2,838,700 | 4,004,400 |

1/ Price base - 1975.

## Structural Measures

The total installation cost for structural measures includes cost of construction, engineering services, land rights, relocation payments, and project administration. These installation costs are shown in tables 1 and 2.

The construction costs were based on recent contract data for P.L. 566 projects in Wisconsin. The construction costs include contingencies of 8 to 12 percent.

The cost of engineering services includes services of engineers, hydrologic engineers, and geologists for surveys, site investigations, soil mechanics, structural designs, flood routing, and construction plans and specifications. Engineering services costs are based on site conditions and design complexity.

Land rights include the acquisition of land by fee title or certain designated rights to the use of land by perpetual easement. In addition to the cost of acquiring absolute or limited rights to the use of land, land rights costs also include the cost of modifying utilities, roads, and other improvements. The estimated cost of land acquisition including buildings and other improvements were based on assessments provided by the Richland County Soil and Water Conservation District. Costs for road and utility relocation were based on site-by-site engineering estimates including construction and associated engineering services. The Richland County Soil and Water Conservation District is responsible for acquiring all land rights. Specific land rights items are shown by site on page 14. The cost of all land rights associated with the dikes and the

seven floodwater retarding structures will be paid from other funds. Cost of the land rights required for two recreational developments will be shared between P.L. 566 and other funds.

Relocation payments include moving and related expenses for a displaced person, business, or farm operation. Financial assistance is provided for replacement housing for a displaced person who qualifies and whose dwelling is acquired because of the project. Fifteen relocations are involved in this project. These relocations include 2 outbuildings, 8 houses, 12 farmsteads, 2 trailers, 1 barn, 1 cabin, 1 salt shed, and 53 individuals (15 families).

The costs of project administration are those associated with the installation of structural measures. This includes costs for contract administration, relocation assistance advisory services, administrative duties associated with relocation payments, review of engineering plans prepared by others, government representatives, construction layout, and necessary inspection service during construction to insure that structural measures are installed in accordance with the plans and specifications. Project administration costs for P.L. 566 and other funds are estimated at 14 percent and 2 percent of the construction cost, respectively.

Relocation assistance advisory services are anticipated because of the relocations involved in this project. These services which will be provided by the sponsoring local organization include: (1) determination of needs, (2) obtaining current pertinent information concerning housing programs, costs, etc., (3) developing and handing out brochures, (4) assurance of replacement dwellings, and (5) assisting in getting established. Other administrative functions to be provided as needed include such items as: (1) providing by first-class mail, written notice of displacement and appropriate application forms to each displaced person, business, or farm operation, (2) assistance in filing applications, (3) reviewing and taking action on applications for assistance, (4) reviewing and processing grievances, and (5) making relocation payments.

Multiple-purpose structures 2 and 36 are planned for flood prevention and public recreation. Specific costs include the cost of features that serve a single purpose and can be identified. Specific costs for recreation for MPS's 2 and 36 include modifications for cold water release, rock riprap, and foundation grouting. Joint costs include the cost of features that serve more than one purpose. The joint costs are allocated to flood prevention and recreation by the "use of facilities" method as outlined in the Watershed Protection Handbook. (16)

The joint construction cost of $665,300 for MPS 2 was allocated 45.2 percent to flood prevention and 54.8 percent to recreation. Specific construction costs for recreation are $51,000. Additional costs for the construction of recreational facilities are $179,800.

The joint construction cost of $1,968,000 for MPS 36 was allocated 56.2 percent to flood prevention and 43.8 percent to recreation. Specific construction costs for recreation are $124,200. Cost of constructing the recreational facilities will be $417,000.

- Installation Costs -

Stream habitat improvement features will be installed along 4.5 miles on lower Melancthon Creek. The purpose is to improve the habitat for trout. The estimated installation cost is $63,000.

Expenditures for installation of structural measures during the 8-year period are as follows:

Planned Expenditures for Structural Measures

(Dollars)

| | Installation Cost | | Project Administration | | |
|---|---|---|---|---|---|
| Year | P.L.-566 | Other | P.L.-566 | Other | Total |
| 1 | 143,460 | 116,500 | 36,950 | 14,000 | 310,910 |
| 2 | 530,060 | 521,750 | 94,100 | 37,870 | 1,183,780 |
| 3 | 591,040 | 413,140 | 108,000 | 12,300 | 1,124,480 |
| 4 | 1,248,440 | 648,150 | 189,450 | 30,750 | 2,116,790 |
| 5 | 2,258,350 | 254,200 | 256,300 | 17,700 | 2,786,550 |
| 6 | 1,286,330 | 263,770 | 150,000 | 11,500 | 1,711,600 |
| 7 | 1,519,700 | 276,140 | 180,000 | 13,200 | 1,989,040 |
| 8 | 188,700 | 221,700 | 48,890 | 3,660 | 462,950 |
| TOTAL | | | | | 11,686,100 |

Public Law 566 Funds

The following will be borne by Public Law 566 funds:

1. Share of the cost of installing accelerated critical area stabilization and land treatment measures (Estimated cost $721,600).

2. The cost of technical assistance needed to accelerate the application of land treatment measures (Estimated cost $444,100).

3. Share of the construction cost of the structural measures (Estimated cost $6,639,600). This includes 50 percent of the cost of the recreational facilities ($298,400) and installing trout stream habitat improvement ($15,000).

4. Share of the cost of the engineering services for all structural measures (Estimated cost $662,000). This includes $25,000 for recreational facilities and $17,200 for specifics.

5. Project administration costs incurred by the Federal government (Estimated cost $1,064,500).

6. Share of the cost of acquiring land rights on multiple-purpose structures including recreational facilities (Estimated cost $414,500).

7. Share of relocation costs estimated to be $54,400.

## Other Funds

The following will be borne by other funds:

1. Share of the cost of installing ongoing land treatment measures (Estimated cost $1,123,600).

2. The cost of installing accelerated land treatment measures including critical area stabilization (Estimated cost $2,832,000).

3. Share of the cost of technical assistance for the ongoing land treatment program (Estimated cost $121,400) and for the accelerated land treatment program (Estimated cost $6,700).

4. Project administration cost incurred by the sponsors (Estimated cost $140,000).

5. Share of the cost of land rights for structural measures (Estimated cost $1,631,000).

6. Share of the cost of installing trout stream habitat improvement (Estimated cost including engineering $18,000).

7. Fifty percent of the construction cost of the recreational facilities (Estimated cost $298,400).

8. Fifty percent of the engineering cost for recreational facilities (Estimated cost $25,000).

9. Share of relocation costs (Estimated cost $37,800).

10. Share of the portion of the construction cost for multiple-purpose sites allocated to recreation (Estimated cost including specific costs, $700,900).

Structure locations are shown on the project map in part II, appendix E. Details on quantities, costs, and design features are found in tables 1, 2, 2A, 3, 3A, and 4.

All structures, except MPS 2, will involve raising or rerouting roadway. Other land rights items include moving power poles and buildings. The following table provides a summary of the land rights items involved at each structure.

## Land Rights Items

| Site No. | Land (Acres) | Buildings (No.) | Road Change (Feet) | Power Poles/Other (No./ft.) 1/ 2/ |
|---|---|---|---|---|
| 2 (MPS) | 213 | 2 Outbuildings | 0 | 5 |
| 7 | 62 | 0 | 100 | 4 |
| 9 | 61 | 0 | 1,400 | 5 1/ |
| 11 | 168 | 1 House | 3,650 | 5 |
| 14 | 475 | 3 Farmsteads<br>1 Trailer<br>1 House | 7,500 | 18<br>1,500 2/ |
| 21 | 103 | 2 Houses<br>1 Barn<br>1 Log Cabin | 2,150 | 2<br>10 1/ |
| 32 | 190 | 2 Houses<br>1 House 3/ | 1,000<br>1 Bridge | 5<br>600 2/ |
| 33 | 166 | 1 Farmstead | 1,000 | 2<br>8 1/ |
| 36 (MPS) | 1,925 | 8 Farmsteads | 1 Road abandon-ment | 120 1/<br>8,000 2/ |
| Dike | 29 | 2 Houses<br>1 Salt Shed | 1,600 | 3 1/<br>300 2/ |

1/ Telephone Poles
2/ Buried Cable
3/ Dike Around House Only

The combined project of conservation land treatment and structural measures will reduce estimated average annual direct and indirect floodwater damages below structural works of improvement from $661,200 to $184,400, or 72 percent.

Direct annual primary benefits accruing from the reduction of damage to cropland and grassland are estimated to be $66,500. Those benefits attributable to a reduction in damage to farm buildings, fences, farm machinery, and farm roads and bridges are expected to be $19,300. Estimated direct annual benefits from the reduction of floodwater damage to public roads and bridges are $46,200. Benefits accruing from the reduction of floodwater damage to the city of Richland Center and the communities of Hub City and Rockbridge are estimated to be $269,900. Benefits accruing from the reduction of sediment deposition in the Richland Center Mill Pond are estimated to be $10,200 annually.

Estimated annual indirect benefits are $64,700. These benefits were estimated at 10 percent of total agricultural direct benefits, 20 percent of road and bridge direct benefits, and 15 percent of direct urban benefits. The loss of milk production because of flooding is also included.

The estimated direct and indirect damage reduction benefits from project installation are $476,800. Conservation land treatment will provide $4,600 of this amount.

Total secondary benefits are estimated at $82,200. Redevelopment benefits derived from project-stimulated employment of unemployed labor total $41,800 annually. Secondary benefits from a national viewpoint are not considered pertinent to the economic evaluation. (16)

Anticipated benefits from land conversion on 295 acres are $14,200. This land, now in pasture, is not being cropped because of the hazard of frequent flooding. This pasture is expected to be cropped following installation of project measures.

Recreational benefits from MPS's 2 and 36 were estimated at $321,400 annually and were computed on the basis of 142,800 annual visitations. Visitations at MPS's 2 and 36 have been substantiated by data obtained from an SCS summer 1975 survey of P.L. 566 multiple-purpose reservoirs. Blackhawk Lake was used as the foundation for a comparative analysis since it is similar to site 36 in many respects.

## COMPARISON OF BENEFITS AND COSTS

The ratio of the average annual benefits (excluding secondary), $849,600, to the estimated average annual costs, $806,600, is 1.1 to 1.0. Total average annual benefits, including secondary benefits, is $931,800. The benefit-cost ratio is 1.2 to 1.0. Table 6 shows a comparison of average annual costs to average annual benefits.

## INSTALLATION PROVISIONS

Performance of this plan will be a joint undertaking of nonfederal and Federal interests. Nonfederal interests include the Richland and Vernon County Soil and Water Conservation Districts (SWCD's), the University of Wisconsin Extension Service, and the Wisconsin Department of Natural Resources. Federal agencies involved with the project are the Agricultural Stabilization and Conservation Service, the Forest Service, and the Soil Conservation Service of the U.S. Department of Agriculture and the Fish and Wildlife Service of the U.S. Department of the Interior.

Some of the conservation land treatment measures will be installed by landowners and operators as cooperators with the Richland and Vernon County SWCD's. The critical area stabilization land treatment measures will be installed by the sponsoring local organization.

In order to coordinate the installation of conservation land treatment measures and structural measures provided for in this plan, close cooperation and responsiveness are required of private interests, the sponsoring local organization, and Federal agencies assisting with the project. The Richland and Vernon County SWCD's will have primary responsibility for accomplishing the plan.

The Richland and Vernon County Soil and Water Districts will:

1. Provide technical assistance to landowners and operators in the watershed to assure the application of conservation land treatment measures outlined in the plan.

2. Carry out and assume the responsibility and all liability for the construction, operation, and maintenance of critical area stabilization land treatment measures installed with P.L. 566 cost-sharing.

3. Provide the local share of funds for installation of P.L. 566 cost-shared critical area stabilization land treatment measures.

4. Conduct informational and educational programs as needed to properly inform local people of the project.

5. Obtain cooperative agreements with landowners and operators to install conservation land treatment measures during the project period.

The Richland County Soil and Water Conservation District will:

1. Carry out and assume the responsibility and all liability for the construction, operation, and maintenance of structural measures and recreational facilities.

2. Acquire all land rights needed in connection with the works of improvement. The power of eminent domain will be exercised if necessary. The power of eminent domain for purposes of flood prevention and recreation is vested in county soil and water conservation districts under Sec. 92.08(3), Wisconsin Statutes. Qualified appraisers will be retained to determine property values.

3. Provide plans and specifications, subject to concurrence by the Soil Conservation Service, for recreational facilities. Architectural and engineering services for recreational facilities, except those furnished by the Wisconsin Department of Natural Resources, will be obtained through a contractual agreement with a private consultant.

4. Provide sanitary facilities which will meet minimum State and local requirements where public access is provided.

5. Determine that decent, safe, and sanitary replacement housing will be available for all persons subject to displacement by the project and that displaced persons will be given notice to vacate at least 90 days before they have to move.

6. Provide personally or by first class mail, written notice of displacement and appropriate application forms to each displaced person, business, or farm operation.

7. Assist in filing applications.

8. Review and take action on applications for relocation assistance.

9. Review and process grievances in connection with displacements.

10. Make relocation payments.

11. Provide such relocation assistance advisory services as may be needed in connection with the relocation of displaced persons, businesses, or farm operations.

12. Act as contracting organization for the construction of all structural measures.

13. Prior to entering into agreements that obligate funds of the Service, the Richland County SWCD will have a financial management system for control, accountability, and disclosure of P.L. 566 funds received, and for control and accountability for property and other assets purchased with P.L. 566 funds.

Program income earned during the grant period will be reported on the sponsor's request for advance or reimbursement from the Service.

The Richland County Soil and Water Conservation District will be responsible for the following items; however, it is expected that they will be performed by the Wisconsin Department of Natural Resources through a separate agreement with the SWCD.

1. Furnish the Soil Conservation Service with design criteria and provisions required for proper operation and management of water resources and water and land as related to fish and wildlife.

2. Design and install access roads to navigable water, boat ramps, and car-trailer parking facilities.

3. Provide, subject to concurrence by the Soil Conservation Service, all necessary engineering services, plans, and specifications required for the installation of the stream habitat improvement.

4. Install the stream habitat improvement.

The University of Wisconsin Extension Service will:

Provide educational and informational services to the Richland and Vernon County SWCD's.

The Fish and Wildlife Service will:

Provide consultive services on propagation of wildlife resources, fishery resources, habitat preservation, and endangered and threatened species.

The Agricultural Stabilization and Conservation Service will:

Provide Federal cost-sharing assistance in accordance with existing Agricultural Stabilization and Conservation Service policies and procedures to individual landowners in applying approved conservation practices.

The Forest Service will:

Through cooperative agreements with the Wisconsin Department of Natural Resources, Bureau of Forest Management, furnish technical assistance for forest land treatment measures to be installed by landowners.

The Soil Conservation Service will:

1. Furnish technical assistance through the Richland and Vernon County SWCD's to landowners for the application of the conservation land treatment measures outlined in this plan.

2. Furnish engineering services for engineering surveys, design, land rights work map, construction plans, and specifications for structural works of improvement.

3. Inspect the recreational facilities to determine acceptance for payment.

4. Inspect the stream habitat improvement to determine acceptance for payment.

5. Assist the Richland County SWCD in fulfilling their relocation assistance advisory services responsibilities.

6. Allot P.L. 566 construction funds in accordance with cost sharing and the installation schedules outlined in this plan on pages 10 and 23 or as may be revised by mutual consent. Allocations of funds will be in accordance with national priorities and availability at the time of installation.

7. Request technical assistance from the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources concerning final design and the operation and maintenance plan for each structural measure regarding fish and wildlife features.

8. Maintain liaison with the sponsoring local organization, State, and other Federal agencies involved so that the objectives outlined in this plan will be accomplished.

Installation of the trout stream habitat improvement will be accomplished by the Wisconsin Department of Natural Resources. This work will be done through a contract agreement with the Richland County SWCD and be subject to approval by the Soil Conservation Service and should be done as soon as flood protection is provided.

Construction of structural works of improvement for the dikes and outlet system, seven floodwater retarding structures, and two multiple-purpose structures will be accomplished by formal contract. All contracts will be awarded on the basis of competitive bidding by qualified bidders. Contracts will be administered by the sponsoring local organization.

Project agreements will be executed for each contract unit of work by the sponsoring local organization and the SCS. Prior to the execution of such an agreement, all land, easements, and rights-of-way will be obtained and properly recorded by the sponsoring local organization.

The schedule for installation of the structural works of improvement established for the 8-year project period is as follows:

| Year | Works of Improvement |
|---|---|
| First | Obtain land rights and complete designs for structures 2, 7, and 9. |
| Second | Obtain land rights and complete designs for structures 14 and 32. Construct structures 7 and 9. |
| Third | Obtain land rights and complete designs for structures 11 and 21. Design recreational facilities for structure 2. Construct structure 2. Obtain land rights for trout stream habitat improvement. |
| Fourth | Obtain land rights and complete designs on structures 33 and 36. Construct structures 32 and 21 and recreational facilities for structure 2. |
| Fifth | Design recreational facilities for structure 36. Construct structures 11 and 14. Obtain land rights for dikes and outlet system. Install trout stream habitat improvements. |
| Sixth | Design dikes and outlet system. Construct structure 33 and start structure 36. |
| Seventh | Complete structure 36 and construct dikes and outlet system. |
| Eighth | Construct recreational facilities for structure 36. |

Conservation land treatment measures installed without P.L. 566 cost-sharing will be operated and maintained by landowners and operators. This will be accomplished under a district-cooperator agreement with the soil and water conservation districts. Technical assistance will be available from the Wisconsin Department of Natural Resources, Bureau of Forest Management, in cooperation with the U.S. Forest Service and the U.S. Soil Conservation Service. The Richland and Vernon County SWCD's will operate and maintain all structural and critical area stabilization land treatment works of improvement after they are installed.

Proper operation of the existing Mill Pond outlet structure on Pine River in the city of Richland Center is an important element in the flood prevention plan for the city. Structural works of improvement will reduce and confine flood peaks through Richland Center, but with improper operation, the existing dam can reduce the effectiveness of these measures.

The Richland County SWCD has obtained a commitment from the city of Richland Center that the Mill Pond outlet structure will be operated according to the operation schedule. In essence, one stop log will be removed from each gate when the lake surface rises to within 4.1 feet from the top of the deck. When the water surface comes within 2.6 feet of the deck, an additional stop log will be removed from each gate. All stop logs will be removed when the water surface comes within 1.6 feet from the top of the deck.

The District has obtained commitments from the Richland and Vernon County Boards that they will furnish necessary funds for operation, maintenance, and replacement of all works of improvement installed under this plan. This commitment is in the form of a resolution passed by the County Boards. The sponsoring local organization may enter into agreements with other entities to carry out the operation and maintenance activities.

The sponsoring local organization is responsible for the proper operation and maintenance, without cost to the Federal government, of works of improvement which are installed in part with P.L. 566 funds and for which there will be a continuing need for operation and maintenance. They are also responsible for obtaining all necessary permits.

The structural measures for flood prevention are basically automatic in operation and require no manual operation to achieve the level of flood protection outlined in this plan. In the event that localized flooding occurs inside of the dike, one standby portable pump will require manual attendance. Operation of the gated sediment pools (either wet or dry) will be stated in agreements with the Wisconsin Department of Natural Resources when permits are applied for. Specific items necessary for the operation and maintenance of the works of improvement shall include, but are not limited to the following:

1. Periodic maintenance will be required to insure proper functioning of the structural works including pumps and pump installations.

2. All structures and recreational facilities are to be maintained by making repairs or replacements as needed.

3. Repairs to structures or structural features damaged by floods will be made promptly.

4. Obstructions, trash, and debris are to be removed from the principal and emergency spillway inlets, outlets, internal drainage collection basins, and other structural works during and/or immediately after storm events.

5. A drainage gradient will be maintained through the dry sediment pools so that no stagnant pools are formed. This must be done to eliminate potential health hazards and mosquito breeding areas.

6. Mowing of the structure sites and sediment pools will be restricted to prevent damage to nesting habitat; however, mowing will be often enough to maintain good grass cover on the structures. In addition, spot control of noxious weeds may be necessary. This could be accomplished by mowing or use of approved herbicides.

Stream habitat improvement features will involve replacement and frequent maintenance to insure effective operation. The Richland County SWCD, who has the responsibility for operation and maintenance, will enter into a separate operation and maintenance agreement with the Wisconsin Department of Natural Resources prior to the installation of stream habitat improvement features.

Specific items necessary for operation and maintenance of the trout stream habitat improvement features on Melancthon Creek shall include, but are not limited to the following:

1. Periodic maintenance will be required to insure proper functioning of instream devices.

2. Bank stabilization features are to be maintained by making repairs or replacements as needed.

3. Noxious weeds and woody plants are to be controlled.

4. Obstructions, trash, and debris are to be removed from the stream.

Annual operation, maintenance, and replacement cost of the works of improvement is estimated to be $91,600. This includes $8,900 for flood prevention, $80,000 for recreation, and $2,700 for stream habitat improvement.

The annual operation and maintenance cost for flood prevention includes $5,690 for the seven floodwater retarding structures, $1,200 for the dikes and outlet system (including pump and pipe replacement), and $2,010 for the flood prevention portion of the two multiple-purpose structures.

The annual operation and maintenance cost for the recreational development includes $1,700 for the recreation portion of the two multiple-purpose structures and $78,300 for the recreational facilities. The recreational facilities cost includes replacement, equipment, custodians, lifeguards, and a manager.

The stream habitat improvement includes $200 for routine annual operation and maintenance and $2,500 for annual replacement cost of instream devices and bank stabilization.

For a period of three years following installation of each structural measure, the Chairman of the Richland County SWCD, President of the Pine River Watershed Association, Chairman of the Highway Committee of the Richland County Board, and a representative of the SCS will make a joint annual inspection. Annual inspections following the third year will be made by the Chairman of the Richland County SWCD, President of the Pine River Watershed Association, and the Chairman of the Highway Committee of the Richland County Board. A report will be sent to the designated SCS representative. Inspections, including a report, will also be made after floods or after the occurrence of any situation which might adversely affect the operation of any of the structural measures. Inspections will cover all portions of each structure, channel below, ponded area above, recreational facilities, and the stream habitat improvement.

The annual and severe storm maintenance inspections will include the determination of vector breeding areas. Those areas caused by the project that might pose a public health threat or nuisance to the public will be eliminated.

The installation, operation, and maintenance of the planned works of improvement must meet the requirements of the Wisconsin Department of Health and Social Services and the Richland County Public Health Nursing Service.

Representatives of the Federal, State, and county governments shall have free access at all times to the structural works of improvement for official activities. All phases of operation and maintenance of these facilities shall comply with applicable local, State, and Federal regulations.

A separate operation and maintenance (O&M) agreement will be prepared for each structural measure. An O&M agreement will be prepared for critical area stabilization land treatment measures. These agreements will contain, in addition to specific sponsor responsibilities for structural measures, specific provisions for retention and disposal of property acquired or improved with P.L. 566 financial assistance. All operation and maintenance agreements must be executed prior to the signing of the land rights agreement or the project agreement for construction of structural measures.

- Operation and Maintenance Provisions -

Each operation and maintenance agreement will contain a reference to the State of Wisconsin Watershed Operation and Maintenance Handbook for Projects Installed With Assistance from the Soil Conservation Service. An operation and maintenance resource conservation plan will be prepared for each structural measure and for critical area stabilization land treatment measures.

## FINANCING PROJECT

The project installation costs allotted to P.L. 566 will be paid from funds appropriated under the authority of P.L. 566, 83d Congress, 68 Stat. 666, as amended. This plan does not constitute a financial document for obligation of Federal and other funds.

Financial or other assistance to be furnished by the SCS or the Wisconsin Department of Natural Resources in carrying out the plan is contingent upon the appropriation of funds for this purpose.

The costs of installing some conservation land treatment measures will be borne by the individual landowners or operators with such financial assistance as may be available from county, State, or Federal funds. The remaining cost for land treatment measures (critical area stabilization) will be shared between the sponsoring local organization and the SCS.

The SCS will continue to provide technical assistance for conservation land treatment at the present rate under the ongoing program. Public Law 566 funds will be used to accelerate land treatment during the project installation period.

Forest land treatment measures will be installed using private and public funds. They will be implemented through the ongoing Cooperative Forestry Programs and through an accelerated P.L. 566 program. Technical assistance will be cost-shared between the Forest Service and the Wisconsin Department of Natural Resources.

The installation costs for structural measures not borne by P.L. 566 funds will be the responsibility of the Richland County SWCD. Land acquisition, easements, and rights-of-way will be negotiated for or acquired by eminent domain. The District has analyzed its financial needs in consideration of the scheduled works of improvement so that funds will be available when needed. Funds will be provided to the District by the Richland County Board to meet their share of the project installation cost including relocation payments and relocation assistance advisory services.

The Richland County Board has provided funds on an annual basis to Richland County SWCD for this project. The District has on deposit, $90,000 to be used for project installation. They have purchased 270 acres of land in anticipation of the project being installed. User fees will be charged at the recreational developments to help defray operation and maintenance costs. The Pine River Watershed Association may accept and provide to the District, cash or land rights donations on a tax deductible basis.

Program income earned during the grant period will be reported on the sponsoring local organization's request for advance for reimbursement from the Service. Program income may include, but not be limited to, income from service fees, usage, or rental fees for the sale of assets projected with Federal funds under a Service fund agreement. For this purpose the grant period shall extend from the effective date of the Service fund obligating agreement until the date on which the SCS formerly notifies the sponsoring local organization that the undertaking has been satisfactorily completed.

TABLE 1 - ESTIMATED INSTALLATION COST

PINE RIVER WATERSHED, WISCONSIN

| Installation Cost Item | Unit | Number | Estimated Cost (Dollars) 1/ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Public Law 566 Funds | | | Other | | | |
| | | Nonfederal Land | Nonfederal Land SCS 3/ | FS 3/ | Total | Nonfederal Land SCS 3/ | FS 3/ | Total | TOTAL |
| Land Treatment-Ongoing Program | Acres to be treated | | | | | | | | |
| Land Areas 2/ | | | | | | | | | |
| Cropland | | 3,130 | | | | 142,700 | | 142,700 | 142,700 |
| Grassland | | 8,530 | | | | 535,500 | | 535,500 | 535,500 |
| Forest Land | | 15,070 | | | | 148,100 | 209,300 | 357,400 | 357,400 |
| Urban and Built-up | | | | | | | | | |
| Other Land | | 130 | | | | 88,000 | | 88,000 | 88,000 |
| Technical Assistance | | | | | | 92,800 | 28,600 | 121,400 | 121,400 |
| SUBTOTAL - Ongoing Program | | | | | | 1,007,100 4/ | 237,900 | 1,245,000 | 1,245,000 |
| Land Treatment - Accelerated | | | | | | | | | |
| Land Areas 2/ | | | | | | | | | |
| Cropland | | 8,030 | | | | 1,143,200 | | 1,143,200 | 1,143,200 |
| Grassland | | 4,447 | | | | 689,400 | | 689,400 | 689,400 |
| Forest Land | | 17,430 | | | | 578,200 | 75,800 | 853,800 | 853,800 |
| Urban and Built-up | | | | | | | | | |
| Other Land | | 70 | | | | 105,000 | | 105,000 | 105,000 |
| Critical Area Stabilization | | | | | | | | | |
| Streambank Stabilization | Feet | 77,925 | 584,400 | | 584,400 | 194,800 | | 194,800 | 779,200 |
| Grade Stabilization | Number | 122 | 137,200 | | 137,200 | 45,800 | | 45,800 | 183,000 |
| Technical Assistance | | | 402,700 | 41,400 | 444,100 | | 6,700 | 8,700 | 450,800 |
| SUBTOTAL - Accelerated | | | 1,124,300 | 41,400 | 1,185,700 | 2,758,400 5/ | 82,300 | 2,838,700 | 4,004,400 |
| TOTAL - Land Treatment | | | 1,124,300 | 41,400 | 1,165,700 | 3,763,500 | 320,200 | 4,083,700 | 5,249,400 |
| Structural Measures | | | | | | | | | |
| Construction | | | | | | | | | |
| Floodwater Retarding Structure | Each | 7 | 3,531,000 | | 3,531,000 | | | | 3,531,000 |
| Dikes and Outlet System | Each | 1 | 887,600 | | 687,600 | | | | 887,800 |
| Multiple Purpose Structure | Each | 2 | 2,107,600 | | 2,107,600 | 700,900 | | 700,900 | 2,808,500 |
| Recreational Facilities | Each | 2 | 298,400 | | 298,400 | 298,400 | | 298,400 | 598,800 |
| Trout Stream Improvement | Miles | 4.5 | 15,000 | | 15,000 | 15,000 | | 15,000 | 30,000 |
| SUBTOTAL - Construction | | | 6,639,600 | | 6,639,600 | 1,014,300 | | 1,014,300 | 7,653,900 |
| Engineering Services | | | 662,000 | | 662,000 | 28,000 | | 28,000 | 690,000 |
| Relocation Payments | | | 54,400 | | 54,400 | 37,800 | | 37,800 | 92,200 |
| Project Administration | | | | | | | | | |
| Construction Inspection | | | 754,100 | | 754,100 | | | | 754,100 |
| Other | | | 310,400 | | 310,400 | 135,400 | | 135,400 | 445,800 |
| Relocation Assistance Advisory Services | | | | | | 4,800 | | 4,600 | 4,800 |
| SUBTOTAL - Administration | | | 1,064,500 | | 1,064,500 | 140,000 | | 140,000 | 1,204,500 |
| Other Costs | | | | | | | | | |
| Land Rights | | | 414,500 | | 414,500 | 1,631,000 | | 1,631,000 | 2,045,500 |
| SUBTOTAL - Other | | | 414,500 | | 414,500 | 1,631,000 | | 1,631,000 | 2,045,500 |
| TOTAL - Structural Measures | | | 8,835,000 | | 8,835,000 | 2,851,100 | | 2,851,100 | 11,886,100 |
| TOTAL PROJECT | | | 9,959,300 | 41,400 | 10,000,700 | 6,614,600 | 320,200 | 8,934,800 | 16,935,500 |

1/ Price base 1975.

2/ Includes only areas estimated to be adequately protected during the project installation period. Treatment will be accelerated throughout the watershed, and dollar amounts apply to total land areas not just to adequately protected areas. Both management and structural conservation measures are included.

3/ Federal agency responsible for assisting in installation of works of improvement.

4/ Includes small on-farm floodwater retarding structures estimated to cost $160,000 of which approximately $40,000 will be spent on floodwater retarding structures located on forest land.

5/ Includes small on-farm floodwater retarding structures estimated to cost $1,940,000 of which approximately $485,000 will be spent on floodwater retarding structures located on forest land.

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT
(As of June 30, 1974)
PINE RIVER WATERSHED, WISCONSIN 1/

| Measures | Unit | Applied to Date | Total Installation Cost Dollars |
|---|---|---|---|
| Access Road | Feet | 67,250 | 124,400 |
| Agricultural Waste Management System | Number | 2 | 6,000 |
| Brush Management | Acres | 30 | 300 |
| Conservation Cropping System | Acres | 33,781 | 50,700 |
| Contour Farming | Acres | 18,175 | 18,200 |
| Critical Area Planting | Acres | 202 | 40,400 |
| Crop Residue Use | Acres | 6,071 | 3,000 |
| Cropland to Grassland | Acres | 13,894 | 1,181,000 |
| Diversion | Feet | 132,215 | 52,900 |
| Drain | Feet | 33,400 | 16,700 |
| Drainage Field Ditch | Feet | 96,275 | 48,100 |
| Farmstead and Feedlot Windbreak | Acres | 1 | 100 |
| Fencing | Feet | 22,005 | 16,500 |
| Fire Control (FS) | Acres | 57,800 | 58,000 |
| Fish Pond Management | Number | 25 | 3,100 |
| Floodwater Retarding Structure | Number | 36 | 180,000 |
| Grade Stabilization Structure | Number | 101 | 151,500 |
| Grassed Waterway or Outlet | Acres | 138 | 82,800 |
| Heavy Use Area Protection | Acres | 36 | 39,600 |
| Hedgerow Planting | Feet | 4,000 | 2,000 |
| Logging Road Erosion Control (FS) | Acres | 2 | 300 |
| Minimum Tillage | Acres | 550 | 300 |
| Mulching | Acres | 37 | 4,800 |
| Non-crop to Wildlife-recreation | Acres | 4,665 | 2,300 |
| Pasture and Hayland Management | Acres | 34,022 | 34,000 |
| Pasture and Hayland Planting | Acres | 5,209 | 520,000 |
| Pond | Number | 173 | 346,000 |
| Recreation Area Improvement | Acres | 29 | 4,400 |
| Recreation Land Grading & Shaping | Acres | 55 | 22,000 |
| Recreation Trail and Walkway | Feet | 23,200 | 10,400 |
| Spring Development | Number | 17 | 8,500 |
| Streambank Protection | Feet | 6,500 | 65,000 |
| Stripcropping | Acres | 32,511 | 130,000 |
| Structure for Water Control | Number | 8 | 6,400 |
| Terrace, Gradient | Feet | 36,700 | 36,700 |
| Timber Stand Improvement 2/ | Acres | 3,532 | 104,300 |
| Tree Planting (FS and SCS) | Acres | 883 | 66,200 |
| Wildlife Upland Habitat Management | Acres | 1,675 | 30,100 |
| Wildlife Wetland Habitat Management | Acres | 211 | 3,800 |
| Woodland Grazing Control (Livestock exclusion) | Acres | 7,500 | 60,000 |
| Woodland Management Plans (FS) | Acres | 2,945 | 4,100 |
| Installation Subtotal | | | 3,534,900 |
| Technical Assistance Cost | | | 317,385 |
| TOTAL | | | 3,852,280 |

1/ Price base 1975.

2/ Includes woodland improved harvesting, woodland improvement, and woodland pruning.

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION
PINE RIVER WATERSHED, WISCONSIN
(Dollars) 1/

| Item | Installation Cost Public Law 566 Funds | | | | | Installation Cost - Other Funds | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Construction | Engi-neering | Land Rights | Relocation Payments 2/ | Total P.L. 566 | Construction | Engi-neering | Land Rights | Relocation Payments 2/ | Total Other | Total Installation Cost |
| Floodwater Retarding Structures: | | | | | | | | | | | |
| 7 | 164,000 | 19,500 | | | 183,500 | | | 26,400 | | 26,400 | 209,900 |
| 9 | 178,600 | 21,400 | | | 200,000 | | | 44,400 | | 44,400 | 244,400 |
| 11 | 363,900 | 43,700 | | 1,500 | 409,100 | | | 116,200 | 1,000 | 117,200 | 526,300 |
| 14 | 1,771,800 | 141,700 | | 7,400 | 1,920,900 | | | 392,100 | 5,200 | 397,300 | 2,318,200 |
| 21 | 297,000 | 30,000 | | | 327,000 | | | 80,500 | | 80,500 | 407,500 |
| 32 | 357,900 | 36,000 | | 3,900 | 397,800 | | | 120,300 | 2,700 | 123,000 | 520,800 |
| 33 | 397,800 | 48,000 | | 2,000 | 447,800 | | | 91,000 | 1,500 | 92,500 | 540,300 |
| Dikes and Outlet System 6/ | 687,600 | 68,800 | | 5,900 | 762,300 | | | 231,800 | 4,100 | 235,900 | 998,200 |
| SUBTOTAL | 4,218,600 | 409,100 | | 20,700 | 4,648,400 | | | 1,102,700 | 14,500 | 1,117,200 | 5,765,600 |
| Multiple Purpose Structure No. 2 | 483,000 | 53,200 | 41,800 | 2,700 | 580,700 | 182,300 | | 43,600 4/ | 1,800 | 227,700 | 808,400 |
| Specific | 25,500 | 5,300 | | | 30,800 | 25,500 | | | | 25,500 | 56,300 |
| Recreational 3/ Facilities | 89,900 | 7,500 | | | 97,400 | 89,900 | 7,500 | | | 97,400 | 194,800 |
| SUBTOTAL | 598,400 | 66,000 | 41,800 | 2,700 | 708,900 | 297,700 | 7,500 | 43,600 | 1,800 | 350,600 | 1,059,500 |
| Multiple Purpose Structure No. 36 | 1,537,000 | 157,500 | 372,700 | 31,000 | 2,098,200 | 431,000 | | 454,700 5/ | 21,500 | 907,200 | 3,005,400 |
| Specific | 62,100 | 11,900 | | | 74,000 | 62,100 | | | | 62,100 | 136,100 |
| Recreational Facilities 3/ | 208,500 | 17,500 | | | 226,000 | 208,500 | 17,500 | | | 226,000 | 452,000 |
| SUBTOTAL | 1,807,600 | 186,900 | 372,700 | 31,000 | 2,398,200 | 701,600 | 17,500 | 454,700 | 21,500 | 1,195,300 | 3,593,500 |
| Trout Stream Improvement | 15,000 | | | | 15,000 | 15,000 | 3,000 | 30,000 | | 48,000 | 63,000 |
| SUBTOTAL-Installation | 6,639,600 | 662,000 | 414,500 | 54,400 | 7,770,500 | 1,014,300 | 28,000 | 1,631,000 | 37,800 | 2,711,100 | 10,481,600 |
| Project Administration | | | | | 1,064,500 | | | | | 140,000 | 1,204,500 |
| GRAND TOTAL | | | | | 8,835,000 | | | | | 2,851,100 | 11,686,100 |

1/ Price base 1975.
2/ Relocation costs are to be shared 59.0 percent from P.L. 566 funds and 41.0 percent from other funds.
3/ Engineering services contract costs to be borne: $25,000 by P.L. 566 funds and $25,000 by other funds.
4/ Includes $1,800 for legal fees, surveys, and modification of improvements.
5/ Includes $82,000 for legal fees, surveys, and modification of improvements.
6/ Includes $15,600 for pumping equipment costs.

MAY 1976

TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY
PINE RIVER WATERSHED, WISCONSIN
(Dollars) 1/

| Item | COST ALLOCATION | | | | COST SHARING | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PURPOSE | | | | P.L. 566 | | | | OTHER | | | |
| | Flood Prevention | Fish and Wildlife | Recreation | Total | Flood Prevention | Fish and Wildlife | Recreation | Total | Flood Prevention | Fish and Wildlife | Recreation | Total |
| Floodwater Retarding Structures | 4,767,400 | | | 4,767,400 | 3,886,100 | | | 3,886,100 | 881,300 | | | 881,300 |
| Dikes & Outlet System | 998,200 | | | 998,200 | 762,300 | | | 762,300 | 235,900 | | | 235,900 |
| Multiple-Purpose Structure #2 2/ | 326,800 | | 481,600 3/ | 808,400 | 325,800 | | 254,900 | 580,700 | 1,000 | | 226,700 3/ | 227,700 |
| Specific Costs | | | 56,300 | 56,300 | | | 30,800 | 30,800 | | | 25,500 | 25,500 |
| Rec. Facilities | | | 194,800 | 194,800 | | | 97,400 | 97,400 | | | 97,400 | 97,400 |
| Multiple-Purpose Structure # 36 2/ | 1,224,000 | | 1,781,400 4/ | 3,005,400 | 1,211,900 | | 886,300 | 2,098,200 | 12,100 | | 895,100 4/ | 907,200 |
| Specific Costs | | | 136,100 | 136,100 | | | 74,000 | 74,000 | | | 62,100 | 62,100 |
| Rec. Facilities | | | 452,000 | 452,000 | | | 226,000 | 226,000 | | | 226,000 | 226,000 |
| Trout Stream Improvement | | 63,000 | | 63,000 | | 15,000 | | 15,000 | | 48,000 | | 48,000 |
| TOTAL | 7,316,400 | 63,000 | 3,102,200 | 10,481,600 | 6,186,100 | 15,000 | 1,569,400 | 7,770,500 | 1,130,300 | 48,000 | 1,532,800 | 2,711,100 |

1/ Price base 1975.
2/ Includes estimated relocation payment costs.
3/ Includes $1,800 for legal fees, surveys, and modification of improvements.
4/ Includes $82,000 for legal fees, surveys, and modification of improvements.

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TABLE 2B - ESTIMATED CONSTRUCTION COSTS OF RECREATIONAL FACILITIES FOR MULTIPLE-PURPOSE STRUCTURE NO. 2

Pine River Watershed, Wisconsin

(Dollars) 1/

| Item | Unit | Number | Estimated Unit Cost | Construction Cost |
|---|---|---|---|---|
| Access Road | Feet | 1,350 | 7.20 | 9,720 |
| Car-Boat Trailer Parking | Each | 12 | 300 | 3,600 |
| Access Roads | Feet | 400 | 7.80 | 3,120 |
| Internal Roads (2-way) | Feet | 1,320 | 5.50 | 7,260 |
| Internal Roads (1-way) | Feet | 2,000 | 2.75 | 5,500 |
| Bridge (culvert & asphalt) | Each | 1 | 1,800 | 1,800 |
| Camping Units | Each | 50 | 300 | 15,000 |
| Picnic Tables | Each | 75 | 72 | 5,400 |
| Picnic Area | Acre | 8 | 240 | 1,920 |
| Grills | Each | 25 | 66 | 1,650 |
| Shelter House | Each | 1 | 10,800 | 10,800 |
| Swimming Beach | Feet | 200 | 36 | 7,200 |
| Car Parking | Each | 100 | 240 | 24,000 |
| Changing Booths | Each | 2 | 8,400 | 16,800 |
| Wells (drilled & cased) | Each | 1 | 6,480 | 6,480 |
| Electrical System | Each | 1 | 420 | 420 |
| Water Pressure System | Each | 1 | 2,400 | 2,400 |
| Hand Pump | Each | 3 | 1,140 | 3,420 |
| Toilets (large) | Each | 1 | 9,600 | 9,600 |
| Toilets (small) | Each | 3 | 6,600 | 19,800 |
| Directional Signs | Each | 12 | 78 | 940 |
| Fencing | Rods | 1,440 | 12 | 17,280 |
| Trails-Scenic | Rods | 241 | 6 | 1,450 |
| Trails-Hiking | Rods | 580 | 4.80 | 2,780 |
| Water Fountains | Each | 3 | 480 | 1,440 |
| TOTAL | | | | 179,780 |

1/ Price base 1975.

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TABLE 2B - ESTIMATED CONSTRUCTION COSTS OF RECREATIONAL FACILITIES FOR MULTIPLE-PURPOSE STRUCTURE NO. 36

Pine River Watershed, Wisconsin

(Dollars) 1/

| Item | Unit | Number | Estimated Unit Cost | Construction Cost |
|---|---|---|---|---|
| Access Roads | Feet | 5,300 | 3.60 | 19,100 |
| Boat Ramp | Each | 1 | 2,110 | 2,110 |
| Car-Boat Trailer Parking | Each | 30 | 300 | 9,000 |
| Car-Trailer Services | Each | 1 | 3,600 | 3,600 |
| Internal Roads (2-way) | Feet | 1,700 | 4.80 | 8,160 |
| Internal Roads (1-way) | Feet | 2,500 | 4.80 | 12,000 |
| Bridges (culvert & asphalt) | Each | 3 | 1,800 | 5,400 |
| Access Roads | Feet | 7,000 | 7.20 | 50,400 |
| Camping Units | Each | 75 | 300 | 22,500 |
| Picnic Tables | Each | 135 | 76 | 10,260 |
| Picnic Area | Acre | 10 | 300 | 3,000 |
| Car Parking | Each | 140 | 240 | 33,600 |
| Grills | Each | 16 | 66 | 1,060 |
| Park Office | Each | 1 | 48,000 | 48,000 |
| Shelter House | Each | 1 | 10,800 | 10,800 |
| Swimming Beach | Sq. Ft. | 4,400 | 3.10 | 13,640 |
| Changing Booths | Each | 2 | 8,400 | 16,800 |
| Wells (drilled & cased) | Each | 1 | 5,400 | 5,400 |
| Electrical System | Each | 1 | 360 | 360 |
| Water Pressure System | Each | 1 | 2,400 | 2,400 |
| Water Distribution System | Each | 1 | 1,560 | 1,560 |
| Hand Pump | Each | 1 | 1,140 | 1,140 |
| Toilets (large) | Each | 3 | 9,600 | 28,800 |
| Toilets (small) | Each | 2 | 6,600 | 13,200 |
| Directional Signs | Each | 15 | 120 | 1,800 |
| Foot Bridge | Each | 1 | 12,000 | 12,000 |
| Trails - Scenic | Rods | 1,500 | 6 | 9,000 |
| Signs for Self-Guiding Nature Trail | Each | 42 | 12 | 500 |
| Fencing | Rods | 3,680 | 12 | 44,160 |
| Sanitary Disposal Site | Each | 1 | 14,400 | 14,400 |
| Observation Tower | Feet | 20 | 642 | 12,840 |
| TOTAL | | | | 416,990 |

1/ Price base 1975.

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# TABLE 3 - STRUCTURAL DATA

## STRUCTURES WITH PLANNED STORAGE CAPACITY

PINE RIVER WATERSHED, WISCONSIN

| ITEM | UNIT | STRUCTURE NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 3/ | 7 | 9 | 11 | 14 | 21 | 32 | 33 | 36 3/ | TOTAL |
| Class of Structure | | b | a | a | b | c | b | c | b | c | |
| Drainage Area (Total) | Sq. Mi. | 3.87 | 2.37 | 2.31 | 5.40 | 12.60 | 4.61 | 5.56 | 5.65 | 41.17 | 63.36 |
| Controlled | Sq. Mi. | - | - | - | - | - | - | - | - | - | |
| Curve No. (1-day) (AMC II) | | 72 | 71 | 71 | 71 | 71 | 72 | 71 | 71 | 71 | |
| Elevation Top of Dam 4/ | Ft. | 659.0 | 691.0 | 911.0 | 904.0 | 934.5 | 959.0 | 813.5 | 907.0 | 870.0 | |
| Elevation Crest Emergency Spillway 4/ | Ft. | 652.0 | 865.5 | 908.0 | 897.0 | 926.0 | 953.0 | 604.0 | 900.0 | 864.0 | |
| Elevation Crest High Stage Inlet 4/ | Ft. | - | - | - | - | 696.0 | - | - | - | 645.2 | |
| Elevation Crest Low Stage Inlet 4/ | Ft. | 842.0 | 875.5 | 893.0 | 883.0 | 886.0 | 932.0 | 788.5 | 884.0 | 830.0 | |
| Maximum Height of Dam | Ft. | 61.0 | 38.0 | 36.0 | 40.0 | 65.0 | 55.0 | 40.0 | 43.0 | 65.0 | |
| Volume of Fill | Cu. Yd. | 277,100 | 76,000 | 91,300 | 166,500 | 725,400 | 124,000 | 162,400 | 188,900 | 768,000 | 2,601,600 |
| Total Capacity 1/ | Ac. Ft. | 1,465 | 282 | 290 | 960 | 5,916 | 940 | 1,260 | 1,100 | 17,546 | 29,763 |
| Sediment Submerged | Ac. Ft. | 72 | 43 | 42 | 150 | 155 | 74 | 91 | 95 | 572 | 1,294 |
| Sediment Aerated | Ac. Ft. | 20 | 35 | 34 | 30 | 127 | 63 | 81 | 60 | 106 | 556 |
| Recreation | Ac. Ft. | 803 | - | - | - | - | - | - | - | 7,630 | 6,433 |
| Retarding | Ac. Ft. | 570 | 204 | 214 | 760 | 5,636 | 603 | 1,128 | 925 | 9,236 | 19,496 |
| Between high and low stage | Ac. Ft. | - | - | - | - | 726 | - | - | - | 9,346 | 10,072 |
| Surface Area | | | | | | | | | | | |
| Sediment pool 2/ | Acres | (13) | (14.0) | 12 | 29 | 51 | 18 | (25) | 32 | (120) | 312. |
| Recreation | Acres | 50 | - | - | - | - | - | - | - | 484 | 534 |
| Retarding pool 1/ | Acres | 67 | 27.0 | 22 | 60 | 110 | 63 | 108.5 | 92 | 710 | 1,276 |
| Principal Spillway Design | | | | | | | | | | | |
| Runoff Volume ( 1 day) | In. | 2.52 | 2.40 | 2.40 | 2.52 | 2.60 | 2.52 | 2.60 | 2.52 | 2.60 | |
| Runoff Volume (10 day) | In. | 6.30 | 6.00 | 6.00 | 6.30 | 7.00 | 6.30 | 7.0 | 6.30 | 7.00 | |
| Capacity of Low Stage (Max.) | cfs. | 131 | 66 | 67 | 150 | 213 | 120 | 142 | 105 | 553 | |
| Capacity of High Stage (Max.) | cfs. | - | - | - | - | 642 | - | - | - | 994 | |
| Frequency operation-Emer. Spillway | % chance | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | |
| Dimensions of Conduit R/C | | 30" | 24" | 24" | 36" | 5' X 5' | 30" | 36" | 30" | 7' X 7' | |
| Emergency Spillway Design | | | | | | | | | | | |
| Rainfall Volume (ESH) (areal) | In. | 6.60 | 5.60 | 5.60 | 6.60 | 9.55 | 6.60 | 9.52 | 6.60 | 6.39 | |
| Runoff Volume (ESH) | In. | 3.65 | 2.57 | 2.57 | 3.55 | 5.77 | 3.65 | 5.92 | 3.55 | 4.91 | |
| Storm Duration | Hrs. | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 8.0 | 6.0 | 8.0 | 6.0 | |
| Type ( Primary - Secondary ) | | veg. | veg. | veg. | veg. | R/C + veg. | veg. | veg. | veg. | R/C + veg. | |
| Bottom Width | Ft. | 60 | 60 | 80 | 100 | 400 | 100 | 300 | 60 | 600 | |
| Velocity of flow (Ve) | Ft./Sec. | 4.61 | 6.01 | 5.63 | - | - | 2.95 | 7.27 | 3.79 | - | |
| Slope of exit channel | Ft./Ft. | .04 | .04 | .04 | .04 | .04 | .04 | .04 | .04 | .025 | |
| Max. reservoir water surface elevation 4/ | Ft. | 653.4 | 667.5 | 906.0 | 689.0 | 916.7 | 953.7 | 606.3 | 901.2 | 647.1 | |
| Freeboard Design | | | | | | | | | | | |
| Rainfall Volume (FH) (areal) | In. | 12.35 | 9.55 | 9.55 | 12.35 | 24.50 | 12.35 | 24.45 | 12.35 | 21.57 | |
| Runoff Volume (FH) | In. | 6.66 | 5.95 | 5.95 | 8.51 | 19.72 | 6.66 | 20.15 | 8.51 | 17.21 | |
| Storm Duration | Hrs. | 6.0 | 6.0 | 6.0 | 6.0 | 8.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| Max. reservoir water surface elevation 4/ | Ft. | 858.4 | 890.5 | 911.0 | 903.9 | 934.3 | 958.8 | 609.1 | 906.1 | 869.91 | |
| Capacity Equivalents | | | | | | | | | | | |
| Sediment Volume | In. | .47 | .62 | .62 | .62 | .42 | .56 | .51 | .56 | 0.31 | |
| Retarding Volume | In. | 2.91 | 1.61 | 1.73 | 2.71 | 8.39 | 3.26 | 3.79 | 3.07 | 4.21 | |
| Beneficial Volume | In. | 4.10 | - | - | - | - | - | - | - | 3.46 | |

1/ Crest of emergency spillway, or primary emergency spillway.
2/ Area shown in ( ) contains beneficial storage or sediment capacity will not store water.
3/ Multiple-purpose structure.
4/ Mean sea level.

TABLE 3A - STRUCTURAL DATA
DIKE SYSTEM
PINE RIVER WATERSHED, WISCONSIN

| Reach | Sta. Numbering or Reach (100 ft.) | Top Width (ft.) | Side Slope Upstream | Side Slope Downstream | Average Height (ft.) | Estimated Fill (cu. yds.) | Pump Size (inches) | Capacity (GPM) |
|---|---|---|---|---|---|---|---|---|
| Southwest Dike 2/ | 0 + 70 to 15 + 20 | 10 | 2.5: 1 | 3: 1 | 4.5 | 9,000 | 16 | 9,500 5/ |
| Allison Park Dike 3/ | 3 + 80 to 42 + 10 | 10 | 2.5: 1 | 3: 1 | 5.5 | 27,400 | 8 | 3,000 |
| Main Dike 4/ | 0 + 00 to 80 + 00 | 10 | 2.5: 1 | 3: 1 | 5.8 | 52,400 | 8<br>12 | 3,000<br>5,000 |
| TOTAL | | | 2.5: 1 | 3: 1 | 5.3 | 88,800 1/ | | 20,500 |

1/ Does not include dike core trench.

2/ Southwest dike is on the west side of the Pine River at County Highway "Q". (Seminary Street)

3/ Allison Park dike is north of town on the east and west sides of Highway 80, and west of Pine River.

4/ The main dike is in Richland Center and parallels the east bank of Pine River from east of Highway 80 north, to the junction of the Pine River and Highway 80 south.

5/ Portable tractor-powered unit.

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TABLE 4 - ANNUAL COST

Pine River Watershed, Wisconsin

(Dollars) 1/

| Evaluation Unit | Amortization of Installation Cost 2/ | Operation and Maintenance Cost 3/ | Total |
|---|---|---|---|
| 2, 7, 9, 11, 14, 21, 32, 33, 36, and Dike with Recreational Sites 2 and 36 | 643,700 | 88,900 | 732,600 |
| (Trout Stream Habitat Improvement) 4/ | (3,900) | (2,700) | (6,600) |
| Project Administration | 74,000 | [redacted] | 74,000 |
| | | | |
| TOTAL | 717,700 | 88,900 | 806,600 |

1/ Price base: Installation costs and operation and maintenance costs, 1975.

2/ 100 years @ 6 1/8 percent interest.

3/ Includes $78,300 for operation, maintenance, and replacement for the recreational facilities.

4/ Environmental component not included in the benefit-cost ratio.

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TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Pine River Watershed, Wisconsin

(Dollars) 1/

| Item | Estimated Average Annual Damage | | Damage Reduction Benefit 2/ |
|---|---|---|---|
| | Without Project | With Project | |
| Floodwater | | | |
| Crop and Pasture | 161,600 | 95,100 | 66,500 |
| Other Agricultural | 25,500 | 6,200 | 19,300 |
| Nonagricultural | | | |
| Road and Bridge | 97,900 | 51,700 | 46,200 |
| Urban | 269,900 | 0 | 269,900 |
| SUBTOTAL | 554,900 | 153,000 | 401,900 |
| Sediment | | | |
| Richland Center-Mill Pond | 15,200 | 5,000 | 10,200 |
| SUBTOTAL | 15,200 | 5,000 | 10,200 |
| Indirect | 91,100 | 26,400 | 64,700 |
| TOTAL | 661,200 | 184,400 | 476,800 |

1/ Price base - current normalized prices for agricultural damages (WRC - October 1974); and current prices (1975) for nonagricultural damages.

2/ Limited to areas affected by structural measures.

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Pine River Watershed, Wisconsin

(Dollars)

| Evaluation Unit | AVERAGE ANNUAL BENEFITS 1/ | | | | | Total | 2/ Average Annual Cost | Benefit Cost Ratio |
|---|---|---|---|---|---|---|---|---|
| | Damage Reduction | Changed Land Use Agr. | Recre-ation | Redevelop-ment Benefits | Second-ary | | | |
| 2, 7, 9, 11, 14, 21, 32, 33, 36 & Dikes and Recre-ational facilities at Site 2 and 36 | 472,200 | 14,200 | 321,400 | 41,800 | 82,200 | 931,800 | 732,600 | 1.3 |
| Project Administration | | | | | | | 74,000 | |
| TOTAL | 3/ 472,200 | 14,200 | 321,400 | 41,800 | 82,200 | 931,800 | 806,600 | 1.2 |

1/ Price base - current normalized prices for agricultural damages (WRC - October 1974); and current prices (1975) for nonagricultural damages.

2/ Includes operation, maintenance, replacement, and cost of structural measures amortized over a 100-year period @ 6-1/8 percent interest.

3/ In addition, it is estimated that conservation land treatment will provide flood damage benefits of $4,600.

# PINE RIVER WATERSHED

Richland and Vernon Counties

Wisconsin

## PRINCIPLES AND STANDARDS

Phase-In Addendum

U.S. Department of Agriculture

Soil Conservation Service

Prepared in Fulfillment of the Interim Requirements for Principles and Standards for Planning Water and Related Land Resources Established Pursuant to Sec. 103 of the Water Resources Planning Act (Public Law 89-80)

May 1976

## INTRODUCTION

This addendum was developed in accordance with phase-in procedures adopted by the Water Resources Council for level C plans for which field studies, analysis, and evaluations were completed as of October 25, 1973, and which have been formulated in accordance with Senate Document 97, as supplemented and amended.

Section I of this addendum shows the effect of evaluating the structural measures using 1975 installation costs, a 6 1/8 percent discount rate, current normalized prices for agricultural products (WRC Oct. 1974), current prices (1975) for values other than agricultural products, and current (1975) recreational values in the evaluation of theproject's structural measures.

Section II of the addendum displays an abbreviated alternative plan developed to emphasize environmental quality. This is a hypothetical plan, not to be installed, which presents information for comparison with the selected plan. The basis for costs, benefits, and the discount rate are equivalent to those used for the May 1976 plan.

Section III of the addendum displays the effects of the selected plan as evaluated for each of the separate accounts - national economic development, environmental quality, regional development, and social well-being. Values for costs, prices, and rates are those of the December 1975 plan.

## SECTION I

## EFFECT OF USING CURRENT VALUES FOR EVALUATIONS

The following tabulation shows the effect of evaluating the structural measures using a 6 1/8 percent discount rate, 1975 installation costs, current prices (1975) for values other than agricultural products, current normalized prices for agricultural products (WRC Oct. 1974), and current (1975) recreational values.

| | |
|---|---|
| Average Annual Costs | $806,600 |
| Average Annual Benefits: | |
| Primary Benefits | 807,800 |
| Redevelopment | 41,800 |
| Secondary | 82,200 |
| Total Benefits | $931,800 |
| Benefit to Cost Ratios: | |
| Total Benefits to Cost | 1.2: 1.0 |
| Without Secondary Benefits | 1.1: 1.0 |

SECTION II

## ABBREVIATED ENVIRONMENTAL QUALITY PLAN

### ENVIRONMENTAL QUALITY OBJECTIVE

The environmental quality objective for the Pine River watershed is to manage, conserve, preserve, create, restore, and enhance the quality of the environment.

### ENVIRONMENTAL PROBLEMS

#### Land and Water Quality

Upland sheet erosion in the watershed is the most serious form of erosion in terms of tons of soil lost. Gross erosion on some cropland is as high as 31 tons per acre per year. The watershed average gross erosion on cropland is about 4.4 tons per acre per year. This amounts to 0.52 inches of soil loss in 100 years. Poor drainage due to frequent sedimentation and flooding of the productive soils in the flood plains have pushed intensive cultivation up the slopes causing increased sheet erosion. Healed gullies in the uplands are fairly numerous. Some gullies have active head cutting. Streambank and road ditch erosion are common.

Sediment-laden floodwater is the principal source of sediment damages. The majority of the watershed soils are silty and clayey and are readily carried in suspension by floodwaters. Erosion from cropland is the principal contributor of sediment. Gully, streambank, and roadside erosion are other sources. Excess runoff transports these sediments from the uplands to downstream areas of deposition. Generally, the area of sediment damage is the same area damaged by floodwaters. Sediment damage to cropland and pasture in the flood plain is considered minor. Sediment build-up has greatly reduced the capacity of the Mill Pond at Richland Center. Approximately 30,650 cubic yards of sediment is delivered annually to the Mill Pond which amounts to $15,200 a year in damages.

In urban areas sediment is deposited inside homes and commercial and public buildings. Sediment is also deposited on lawns, gardens, and driveways. Sediment deposited on parks, roads, and other public properties is esthetically undesirable and increases maintenance costs.

Drainage from septic tanks in small unincorporated villages could penetrate the ground water supply causing a pollution hazard. Wastes from cheese and dairy factories cause occasional problems.

Biological Resources

Some portions of quality trout water has deteriorated because of mismanagement of land and water resources and the deposition of sediment in the stream channel. Gravel spawning beds are covered with sediment and debris, leading to generally poor trout survival.

Even though high ground water recharge in recent years and the trend toward purchase of small farms for recreation purposes have tended to improve water quality in the watershed as a whole, localized mismanagement is imposing severe limitations on trout habitat. This situation, which usually involves feedlots, barnyards, and direct livestock access to trout streams, occurs on all major and most feeder streams in the Pine River watershed.

Overgrazing on pastures and forest land has decreased wildlife habitat and increased sheet erosion. Better quality grassland and forest land is needed to provide food and shelter for wildlife.

## COMPONENT NEEDS

1. Preserve land quality.
2. Improve water quality.
3. Maintain and improve upland wildlife habitat.
4. Preserve wetland habitat.
5. Improve wildlife habitat diversity.
6. Protect the fish and wildlife habitat on flood plains and in streams.
7. Establish and manage public wildlife areas.
8. Provide additional environmental education facilities.

## PLAN ELEMENTS

1. Install land treatment measures on 13,800 acres of cropland. These measures include agricultural waste management systems, conservation cropping systems, contour farming, critical area planting, diversions, floodwater retarding structures, grade stabilization structures, grassed waterways or outlets, stripcropping, tree planting, and wildlife upland habitat management. Estimated cost for land treatment measures on cropland is $1,666,800.

2. Improve 14,500 acres of grassland with better management and land treatment practices such as pasture and hayland management, pasture and hayland planting, diversions, floodwater retarding structures, grade stabilization structures, grassed waterways or outlets, and wildlife wetland and upland habitat management. Estimated costs are $1,454,700.

3. Apply management and appropriate land treatment measures on 37,450 acres of forest land. This includes livestock exclusion, critical area planting, wildlife wetland and upland habitat management, logging road and skid trail erosion control, harvest cutting supervision, timber stand improvement, forest management plan development, tree planting, and the installation of diversions, floodwater retarding structures, grade stabilization structures, and grassed waterways or outlets. Marking stands for improvement is a recommended practice for achieving multiple-use sustained yield management on forest lands. Estimated cost for establishing these practices is $1,578,000.

4. Apply critical area treatment such as seeding, fertilizing, and mulching on 80 acres of other and urban land. Estimated cost is $228,000.

5. Establish wildlife habitat improvement and management to provide additional food and cover. Reserve 2 acres per square mile throughout the watershed for exclusive wildlife use. These should be 1- to 2-acre plots protected from livestock use. These plots total about 500 acres and are expected to cost $280,000.

6. Develop additional wetland habitat in upland areas by installing 30 surface water areas. These can be shallow water developments or farm ponds. Expected cost is $90,000.

7. Stabilize many short reaches of streambanks along an accumulative total of 20 miles of channel by sloping and seeding, rip-rapping, and fencing to exclude livestock. Estimated cost is $1,346,500.

8. Install instream devices to improve trout habitat along 8 miles of streams. These improvements may include; but would not be limited to; bank cover, boulder retards, stump cover, wing deflectors, spawning areas, and cattle crossings. Estimated cost is $130,000.

9. Establish an outdoor classroom facility to develop environmental awareness. The facility could include a shelter house, 2 miles of nature trail through different ecosystems, identification markers, and other features. Estimated cost is $185,000.

The installation cost of all 9 elements is $6,959,000.

The Extension Service of the University of Wisconsin can provide educational and research functions. They conduct research and provide information which may be useful in all phases of the environmental quality plan.

The Forest Service can furnish technical assistance through a cooperative agreement with the Wisconsin Department of Natural Resources, Bureau of Forest Management, for forest land treatment measures to be installed by landowners.

The SCS can furnish technical assistance for the application of land treatment measures on cropland, grassland, and other land.

The Agricultural Stabilization and Conservation Service may provide Federal cost-sharing assistance to individual landowners in applying approved conservation practices.

Funds for implementing most plan elements may be available from Farmers Home Administration, as well as local banks and other lending agencies.

Landowners and operators as well as local groups and organizations can furnish labor, land, and financial assistance toward implementation of plan elements.

Other funds may be obtained from various sources such as P.L. 83-566, Outdoor Recreation Assistance Program, county, and other local funds.

The Wisconsin Department of Natural Resources can furnish information and technical assistance regarding biological needs, especially for fish and wildlife management.

The Vernon and Richland County Soil and Water Conservation Districts will furnish information, technical assistance, and financial assistance toward fulfilling plan elements.

The Wisconsin Historical Society and the State Historic Preservation Officer can furnish information and help identify unique historic, archeological, and architectural resources.

## EFFECTS

1. Land treatment will increase the water intake rate into the soil, thus reducing rainfall runoff, soil erosion, sediment deposition in streams, and flood damages. Vegetative growth will be increased.

2. Gross erosion rates will be reduced by about 40 percent.

3. Grassland and forest land management practices will enhance wildlife values and contribute to beautification, esthetic appeal, and environmental quality.

4. Wetlands preservation and wildlife habitat improvement practices will increase the availability of food and cover, resulting in increased wildlife populations, greater diversity of habitat, and a wider distribution of wildlife.

5. Streambank stabilization will reduce bank erosion and improve stream water quality.

6. Overall, the land and water resources in the watershed will be improved.

## SECTION III

## DISPLAY ACCOUNTS

Display accounts for national economic development, environmental quality, regional economic development, and social well-being are shown as a measure of effects of the selected plan. The national economic development account and the regional development account measures have both beneficial and adverse effects. The environmental quality account and the social well-being account do not differentiate between beneficial and adverse effects.

The regional economic development account compares the State of Wisconsin and the rest of the Nation in their relationship between beneficial and adverse effects.

All four accounts developed for the selected plan use existing supporting data from the work plan to develop the display tables.

SELECTED PLAN

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects (Average Annual) (Dollars) |
|---|---|
| **Beneficial Effects:** | |
| A. The value to users of increased outputs of goods and services | |
| 1. Flood prevention | 462,000 |
| 2. Change in land use | 14,200 |
| 3. Recreation | 321,400 |
| 4. Sediment control | 10,200 |
| Total beneficial effects | 807,800 |
| Net beneficial effects | 1,200 |

| Components | Measures of Effects (Average Annual) 1/ (Dollars) |
|---|---|
| **Adverse Effects:** | |
| A. The value of resources required for implementation of elements | |
| 1. Floodwater retarding structures, dikes, and recreational facilities | |
| Project installation 1/ | 643,700 |
| Project Administration 1/ | 74,000 |
| OM&R | 88,900 |
| Total adverse effects | 806,600 |

1/ Amortized for 100 years @ 6 1/8 percent interest.

MAY 1976

SELECTED PLAN

ENVIRONMENTAL QUALITY ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects | Components | Measures of Effects |
|---|---|---|---|
| Beneficial and adverse effects: | | | |
| A. Areas of natural beauty | 1. Provide opportunity for improvement of rural and urban property by reducing floodwater and sediment damages. | C. Biological resources and selected ecosystems | 1. Provide improved wildlife habitat in the form of 4,447 acres of grasslands and 9,509 acres of forest lands. |
| | 2. Create 4 lakes with 573 surface acres with 12 miles of shoreline. | | 2. Improve 4.5 miles of trout habitat. |
| | 3. Reduce acres of land flooded by the 100-year frequency storm from 18,000 to 16,700. | | 3. Alter about 16.3 miles of trout habitat above structures. |
| | 4. Disrupt tranquility of rural environment by providing public access and recreational activities for 142,800 recreation visits. | | 4. Convert 295 acres of grassland to cropland in the flood plain below structures. |
| | 5. Inundate portions of esthetically pleasing natural streams and wetlands. | | |
| | 6. Intercept natural valley vistas by structural measures. | | |
| B. Quality considerations of water, land, and air resources | 1. Implement an accelerated land treatment program to enhance land, water, and air quality. | D. Irreversible or irretrievable commitments | 1. Convert 436 acres of cropland to dams, spillways, and wet sediment pools. |
| | 2. Reduce cropland sheet and gully from 4.4 to 3.0 tons per acre per year on the uplands with land treatment measures. | | 2. Convert about 262 acres of wetlands to wet sediment pools. |
| | 3. Reduce erosion on 48,000 acres of cropland, grassland, and forest land. | | 3. Eliminate 2,530 feet of stream channel (2,090 feet of trout habitat) by pipe outlets through the earthen dams. |
| | 4. Increase air pollution slightly during the project construction period. | | |
| | 5. Change 4,817 acres from private to public ownership. | | |
| | 6. Remove 436 acres of cropland from production. | | |

SELECTED PLAN

REGIONAL DEVELOPMENT ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects: State of Wisconsin (Average Annual) (Dollars) |
|---|---|
| Income: | |
| Beneficial effects: | |
| A. The value of increased output of goods and services to users residing in the region | |
| 1. Flood prevention | 462,000 |
| 2. Land conversion | 14,200 |
| 3. Recreation | 321,400 |
| 4. Sediment control | 10,200 |
| B. Net secondary benefits | 82,200 |
| C. Redevelopment benefits | 41,800 |
| Total beneficial effect | 931,800 |
| Net beneficial effects | 666,300 |

| Components | Measures of Effects: State of Wisconsin (Average Annual) 1/ (Dollars) | Measures of Effects: Rest of Nation (Average Annual) 1/ (Dollars) |
|---|---|---|
| Income: | | |
| Adverse effects: | | |
| A. The value of resources required or displaced by the plan | | |
| 1. Multiple-purpose floodwater retarding structures, dikes, and recreational facilities | | |
| Project Installation 1/ | 167,600 | 476,100 |
| Project Administration 1/ | 9,000 | 65,000 |
| OM&R | 88,900 | - |
| Total adverse effects | 265,500 | 541,100 |

1/ 100 years @6 1/8 percent interest

MAY 1976

SELECTED PLAN

REGIONAL DEVELOPMENT ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects: State of Wisconsin |
|---|---|
| Employment: | |
| Beneficial Effects: | |
| A. Increase in number and types of jobs | |
| 1. Employment for project construction | 6 semiskilled jobs per year for 8 years<br>30 skilled jobs per year for 8 years |
| 2. Employment for O&M | 3.5 permanent semiskilled jobs |
| 3. Employment in recreation service sector | 6 permanent seasonal semiskilled jobs |
| 4. Employment in land treatment construction | 22. 5 semiskilled jobs per year for 8 years |
| 5. Indirect and induced employment for project installation and output of project's goods and services | 14 permanent semiskilled jobs<br>14 permanent skilled jobs |
| Total beneficial effects | 14 permanent skilled jobs<br>17.5 permanent semiskilled jobs<br>30 skilled jobs per year for 8 years<br>28.5 semiskilled jobs per year for 8 years<br>6 permanent semiskilled seasonal jobs |

| Components | Measures of Effects: State of Wisconsin | Rest of Nation |
|---|---|---|
| Employment: | | |
| Adverse Effects: | | |
| Total Adverse Effects | - | - |
| Net Beneficial Effects: | 14 permanent skilled | - |
| | 17.5 permanent semi-skilled jobs | - |
| | 30 skilled jobs per year for 8 years | - |
| | 28. 5 semiskilled jobs per year for 8 years | - |
| | 6 permanent semiskilled seasonal jobs | - |

MAY 1976

SELECTED PLAN

REGIONAL DEVELOPMENT ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects: State of Wisconsin | Measures of Effects: Rest of Nation |
|---|---|---|
| Regional Economic Base and Stability: | | |
| Beneficial Effects: | The project will provide flood protection to an estimated 496 homes, businesses, and 230 agricultural properties with an estimated value in excess of $45,000,000. | - |
| Adverse Effects: | - | - |
| Population Distribution: | | |
| Beneficial Effects: | The project will create 14 permanent skilled jobs, 17.5 permanent semiskilled jobs, and 6 permanent seasonal semiskilled jobs. In addition the project will create 30 skilled and 28.5 semiskilled jobs per year for 8 years in an area where 27 percent of the families have incomes less than $4,000 per year. This project is located in an area where approximately 24.2 percent of the labor force is employed in agriculture as compared to 6.5 percent in the rest of the State. | -<br>- |
| Adverse Effects: | - | - |

SELECTED PLAN

SOCIAL WELL-BEING ACCOUNT

Pine River Watershed, Wisconsin

| Components | Measures of Effects |
|---|---|
| Beneficial and Adverse Effects: | |
| A. Real income distribution | 1. Create 37.5 low to medium income permanent jobs for area residents |
| | 2. $931,800 in secondary and primary benefits acruing from flood protection, change in land use, and recreation are distributed by income class as follows: |

| Income Class 1/ (Dollars) | Percentage of Adjusted Gross Income In Class | Percentage Benefits In Class |
|---|---|---|
| Less than 4,000 | 27 | 10 |
| 4,000 - 10,000 | 43 | 75 |
| More than 10,000 | 30 | 15 |

3. Local costs to be borne by region total $ 265,500 2/ annually with distribution by income class as follows:

| Income Class (Dollars) | Percentage of Adjusted Gross Income In Class | Percentage Contributions In Class |
|---|---|---|
| Less than 4,000 | 27 | 5 |
| 4,000 - 10,000 | 43 | 30 |
| More than 10,000 | 30 | 65 |

| Components | Measures of Effects |
|---|---|
| B. Life, health, and safety | 1. Future threats of flood loss will be reduced. The project will provide benefits to 484 residential and business properties in the urban area of Richland Center. Reduction in depth of flooding will reduce threat of damage to 58 road and bridge locations and a 9,900 acre flood plain. An increased risk of drowning will occur at the recreational sites. |
| | 2. Provide restricted use and development of flood-prone areas, thereby reducing risk of loss of life. |
| | 3. Safety hazards, noise levels, and air pollution from automobiles will increase because of recreational facilities. |
| | 4. Vector breeding sites will increase. |
| C. Recreational opportunities | 1. Provide 142,800 additional activity days of recreation at 2 lakes. |
| | 2. Provide opportunity for regional residents to enjoy the natural, scenic, and esthetic values of the streams. |

1/ 1969 Census.
2/ Does not include local costs of land treatment.

USDA-SCS-EIS-WS-(ADM)-76-1-(F)-WI

# PINE RIVER WATERSHED

Richland and Vernon Counties, Wisconsin

## PART II - FINAL ENVIRONMENTAL IMPACT STATEMENT


Jerome Hytry
State Conservationist
Soil Conservation Service


Sponsoring Local Organization

Richland County Soil and Water Conservation District
Courthouse
Richland Center, Wisconsin 53581

Vernon County Soil and Water Conservation District
Courthouse
Viroqua, Wisconsin 54665


MAY 1976

Prepared by
United States Department of Agriculture
Soil Conservation Service
Madison, Wisconsin 53711

USDA ENVIRONMENTAL IMPACT STATEMENT

Pine River Watershed

Richland and Vernon Counties, Wisconsin

Prepared in accordance with
sec. 102 (2) (c) of Public Law 91-190

SUMMARY

I. Final

II. Soil Conservation Service

III. Administrative

IV. Description of Project Purpose and Action: A project of watershed protection, flood prevention, recreational development, and fish and wildlife improvement in Richland and Vernon Counties, Wisconsin, to be implemented under authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress, 68 Stat. 666), as amended. The planned works of improvement include conservation land treatment, seven floodwater retarding structures, two multiple-purpose structures for flood prevention and recreation, 4.5 miles of trout stream habitat improvement, and dikes and an outlet system along the Pine River in the city of Richland Center.

V. Summary of Environmental Impact and Adverse Environmental Effects: The project will reduce the average annual rate of sheet and rill erosion from 4.1 to 3.0 tons per acre per year. The average amount of sediment reaching the Wisconsin River will be reduced about 32 percent or from 49,000 to 33,300 tons annually. Structural measures will reduce annual floodwater damages by 72 percent on 9,900 acres in the flood plain. Damages caused by Pine River floodwater in the city of Richland Center will essentially be eliminated by the detention structures and the dikes and outlet system. The dikes and outlet system will disrupt the view of Mill Pond. Two wet sediment pools of 14 and 25 acres will become available for incidental recreation. Two lakes of 50 acres and 484 acres will become available for recreation. They will have recreational facilities for fishing, swimming, boating, camping, hiking, and day use. These two sites will provide the opportunity for 142,800 recreation visits. Installation of 4.5 miles of stream habitat improvement should upgrade Melancthon Creek from class II to class I trout water. The proposed installation of the nine dams and associated spillways, conservation pools, and sediment

pools will remove about 436 acres of cropland from production within the pools. An additional 1,106 acres of agricultural land including 404 acres of cropland and associated wildlife habitat will be subjected to occasional short duration flooding. About 5.8 miles of stream will be inundated by the conservation pools and wet sediment pools; 3.3 miles of stream will be within dry sediment pools; and 7.2 miles of stream will be within temporary retarding pools. Pipe outlets through the earthen dams will replace 2,530 feet of stream. Approximately 2,000 feet of channel modification will be required below the structures to safely return the pipe flows to the existing channels.

VI. Alternatives:

1. Continuation of present trends.

2. Accelerated land treatment.

3. Accelerated land treatment, flood plain zoning, floodproofing of existing buildings subject to flood damage, and flood plain evacuation.

4. Accelerated land treatment, flood plain zoning, and 2.5 miles of dikes and outlet system.

5. Accelerated land treatment, flood plain zoning, 2 multiple-purpose floodwater retarding structures (2, 36), and 2.5 miles of dikes and outlet system.

6. Accelerated land treatment, flood plain zoning, 6 single-purpose floodwater retarding structures (7, 9, 11, 14, 21, 33), 2 multiple-purpose floodwater retarding structures (2, 36), and 2.5 miles of dikes and outlet system.

7. Accelerated land treatment, flood plain zoning, 7 single-purpose floodwater retarding structures (7, 9, 11, 14, 21, 32, 33), 1 multiple-purpose floodwater retarding structure (2), and 2.5 miles of dikes and outlet system.

8. Accelerated land treatment, flood plain zoning, and a large dam north of Richland Center.

VII. Agencies From Which Written Comments Have Been Received:

1. U.S. Department of Commerce
2. U.S. Department of Health, Education, and Welfare
3. U.S. Department of the Interior
4. U.S. Department of Transportation
5. U.S. Environmental Protection Agency
6. Wisconsin Board of Soil and Water Conservation Districts
7. Wisconsin Department of Natural Resources
8. Advisory Council on Historic Preservation

VIII. Draft Environmental Impact Statement Transmitted to the Council on Environmental Quality on February 23, 1976

## AUTHORITY

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83d Congress, 68 Stat. 666, as amended.

## SPONSORING LOCAL ORGANIZATION

The Richland and Vernon County Soil and Water Conservation Districts (SWCD's) agreed to serve as the local sponsoring organization for the Pine River watershed project.

## PROJECT PURPOSES AND GOALS

The goals of the local sponsoring organization include watershed protection, flood prevention, recreational development, and fish and wildlife habitat improvement. In the process of planning to meet these goals, the Vernon and Richland County SWCD's and the Soil Conservation Service (SCS) have agreed to combine conservation land treatment and structural measures that will improve the quality of the environment.

### Watershed Protection

The goal for watershed protection is to have approximately 75 percent of the watershed adequately protected by the end of the 8-year project period. The 75 percent goal will be achieved by applying conservation systems to adequately protect an additional 11,160 acres of cropland, 12,980 acres of grassland, 32,500 acres of forest land, and 200 acres of other land within the 8-year project installation period. This can be accomplished through the ongoing and an accelerated technical assistance program.

The primary objective of watershed protection is to reduce erosion and thereby protect the land and water from deterioration. Average gross erosion from the watershed is currently 4.1 tons per acre per year. The ultimate objective is to reduce this to an allowable soil loss, averaging 2.5 tons per acre per year or less. A realistic goal within the 8-year installation period is to reduce the average watershed erosion rate to 3.0 tons per acre per year. This can be achieved by reducing soil loss to or below allowable limits on 75 percent of the cropland, grassland, and forest land.

Other objectives include a reduction in sediment movement and deposition, increased water retention for better crop production, reduced runoff to decrease frequency and severity of floods, better water quality, and fish and wildlife habitat improvement.

### Flood Prevention

The goal of flood prevention measures is to reduce the frequency and magnitude of flooding in areas frequently damaged. The primary objective is to reduce flooding on agricultural and urban lands. The average level of protection desired in the agricultural area is to reduce the frequency of flooding from several times annually to once in 2 to 5 years. The level of protection desired in the urban areas is to eliminate damages for all flood events up to and including the flood expected to occur on the average of once every 100 years. Reduction in erosion and sedimentation are related objectives.

Each county and the city of Richland Center has adopted a flood plain and shoreline ordinance in accordance with Chapters NR115 and NR 116 of the Wisconsin Administrative Code. Strict enforcement of these existing flood plain zoning ordinances will minimize future flood damages.

Richland Center is currently enrolled in a Housing and Urban Development flood insurance program. Residents are eligible for Federally subsidized flood insurance. However, latest reports indicate that very few residents are participating in the program. Residents should be encouraged to participate in this program.

An additional goal is to reduce flood damages by floodproofing and other measures in those areas where structural measures are not feasible or where localized flooding occurs. Floodproofing measures which can be implemented by individual property owners include protective dikes and flood walls, waterproof seals around doors and windows, reinforcement to prevent structural damage, anchoring to resist flotation and lateral movement, and moving high risk items above anticipated flood elevations. (17)

## Recreational Development

A major project purpose is to create recreational opportunities for camping, boating, picnicking, swimming, and other land and water-based activities. One goal is to provide a community type water-based recreational development within bicycling and hiking distance of Richland Center. Another recreational goal is to provide a more extensive water-based development and nature conservancy area that would help meet the recreational and educational needs of the region. See figures 2 and 3 for a detailed listing of facilities.

## Fish and Wildlife Improvement

The goal for fish and wildlife improvement is to improve existing fish habitat and to maintain and improve wildlife upland habitat.

One objective is to improve trout stream habitat by installing instream devices and providing streambank protection. Other objectives include preserving and improving existing habitat by reducing erosion, sedimentation, and pollution. Another objective is to install wildlife upland habitat improvement and management practices on an additional 2,000 acres of upland.

## PLANNED PROJECT

### Conservation Land Treatment Measures

Resource conservation woodland management plans developed for the operating units of the 159,200-acre watershed and implemented on an individual land unit basis will provide for proper land use, adequate protection, and proper management of the land.

A combination of conservation land treatment measures will be applied by individual owners or operators for the purpose of soil and water conservation, particularly in the upland areas. In order to adequately protect the watershed, the Richland and Vernon County SWCD programs will continue to stress the application and maintenance of conservation systems. This includes the use of land within its capabilities and treatment in accordance with its needs.

An accelerated program of conservation land treatment measures is planned during the 8-year project period. Seventy-five percent of the upland area will be adequately protected by the end of this period. Approximately 30,690 acres of cropland, 17,400 acres of grassland, 22,450 acres of forest land, and 2,800 acres of other land are now adequately protected. Within the 8-year project period an additional 11,160 acres of cropland, 12,980 acres of grassland, 32,500 acres of forest land, and 200 acres of other land will be treated.

About 122 grade stabilization structures and 14.8 miles of streambank protection are planned to heal critical sediment-producing areas and is termed critical area stabilization. This is part of the accelerated land treatment program and is included in the acreage totals above.

The conservation land treatment measures to be applied during the 8-year project installation period were determined by the district supervisors and the directors of the Watershed Association based on recommendations of the SCS, U.S. Forest Service, and the Wisconsin Department of Natural Resources.

Conservation land treatment measures and management practices to be applied on cropland, grassland, forest land, and other land (building sites, roads, etc.) include agricultural waste management systems, conservation cropping systems, contour farming, critical area planting, diversions, floodwater retarding structures, grade stabilization structures, grassed waterways or outlets, livestock exclusion (protection from grazing), logging road and skid trail erosion control, minimum tillage, pasture and hayland management, pasture and hayland planting, streambank protection, stripcropping, supervised harvest cutting, timber stand improvement, tree planting, and wildlife upland habitat management.

Agricultural waste management systems vary in size and design, but all consist of three basic components. The first component is a clean water diversion system to prevent both runoff and spring flow from coming in contact with the waste. The second component is a holding and storage area which is usually lined to prevent

ground water contamination. The third component is the application and incorporation of the waste materials into the soil. This can be done by spreading, soil injection, or sprinkler irrigation on unfrozen ground during periods of no surface runoff. Agricultural waste management systems protect water resources, reduce undesirable odors, and improve soil fertility. Improved soil fertility has secondary beneficial effects by improving vegetative growth which improves the soil's ability to resist erosion during periods of surface runoff.

A conservation cropping system is the growing of crops in combination with needed cultural and management measures. Cropping systems include rotations that contain grasses and legumes as well as rotations in which the desired effects are achieved without the use of such crops. Cropping systems reduce soil losses and increase soil fertility. Water quality, natural beauty, and fish and wildlife habitat are improved.

Contour farming is farming sloping, cultivated land so that plowing, preparing land, planting, and cultivating are done on the contour. This includes following the established grades of terraces and diversions. Tillage operations form many small ridges which increase surface storage and moisture infiltration, reducing runoff and erosion.

Critical area planting means establishing vegetation such as trees, shrubs, vines, grasses, or legumes on eroded, sediment-producing areas. This includes steep banks, farm lanes, gullied areas, and streambanks. Critical area planting improves wildlife habitat and enhances natural beauty.

A diversion is a channel with a supporting ridge on the lower side constructed across the slope. It is designed to carry runoff to an area with a suitable outlet. Diversions are frequently used to provide protection to farm buildings, feedlots, and other developments.

Small on-farm floodwater retarding structures installed under the land treatment program typically control runoff and sediment on 50- to 300-acre upland drainage areas. In addition to providing flood protection to individual farms or groups of farms, floodwater retarding structures trap sediment from upland areas before it enters the perennial stream system. They also provide grade stabilization.

Grade stabilization structures are used to stabilize the channel grade and to control erosion (head cutting) in natural or artificial watercourses. They prevent the advance of gullies and improve fish and wildlife habitat by reducing sedimentation and by making conditions more favorable for establishing vegetation.

A grassed waterway or outlet is a natural or constructed outlet that is shaped or graded and established in suitable vegetation as needed for the safe disposal of runoff from a field, diversion, terrace, or other structure. Grassed waterways along with other conservation practices prevent or heal gullies. They also provide field edge for year-round use by wildlife, make good nest sites for ground nesting birds, or can be cropped for hay.

Livestock exclusion is the prevention of grazing. It excludes livestock from forest land and wildlife areas to permit the growth and reproduction of trees, shrubs, grasses, and legumes. Its purpose is to improve the quantity and quality of the plant and animal resources, to maintain enough cover to protect the soil, to maintain moisture resources, to reduce soil compaction, to prevent damage to tree roots and seedlings, and enhance scenic enjoyment. This will allow a litter and humus layer to build up resulting in increased infiltration and ground water storage.

Logging road and skid trail erosion control consists of the use of small diversions and revegetative practices with the objective of stabilizing eroded skid trails and logging roads. The proper location of routes in relation to topography and drainage will minimize soil displacement and sedimentation.

Minimum tillage is reducing the number of cultural operations to those needed to produce a row crop. Leaving crop residue on or near the surface increases water infiltration and reduces soil losses by reducing the impact of raindrops. Elimination of fall plowing provides winter cover and food for wildlife.

Pasture and hayland treatment includes both planting and management. Pasture and hayland planting is the establishment or reestablishment of long-term stands of adapted species of forage plants. Proper treatment and use of pasture and hayland minimize erosion by reducing soil and water losses.

Streambank protection is stabilizing and protecting banks of streams or excavated channels against scour and erosion by vegetative or structural means. This improves fish and wildlife habitat by reducing sedimentation and by establishing vegetation on channel banks. Natural beauty is also enhanced.

Stripcropping is growing crops in a systematic arrangement of strips on the contour or across the general slope to reduce water erosion. Crops are arranged so that a strip of grass or close-growing crop is alternated with a strip of clean-tilled crop or fallow, or a strip of grass is alternated with a close-growing crop. Runoff is slowed and reduced by stripcropping. Alternate strips provide edge area and a balance between food and cover for many upland wildlife species.

Supervised harvest cutting protects or improves forest hydrologic conditions through control of cutting and logging operations. The use of various stand improvement practices will maintain or increase the infiltration capacity of the soil. It includes tree marking to protect against overcutting and to favor the establishment and development of desirable tree species. A stocking level that is conducive to rapid growth and production of maximum amounts of litter and humus is maintained. Hydrologic improvement measures include cuttings to harvest, thin, or weed forest stands. Cutting operations are conducted so that disturbance to the residual vegetative cover is minimal.

Timber stand improvement consists of silvicultural operations that improve hydrologic conditions of private forest lands by manipulation of stand composition. This encourage maximum production and protection of litter, humus, and forest cover. Operations include thinnings; weedings; improvement, salvage, and intermediate harvest cuttings; and supplemental plantings.

Tree planting is planting tree seedlings or cuttings to reduce runoff and erosion by developing a protective cover and an absorbent forest floor of litter and humus.

Wildlife habitat improvement and management is retaining, providing, or managing wildlife habitat. The habitat may be upland or wetland habitat. Small areas planned exclusively for wildlife use are an integral part of many conservation systems. These areas provide food and year-round cover.

A typical combination of practices on sloping cropland fields will be contour stripcropping, conservation cropping systems, diversions, and grassed waterways or outlets. A normal conservation system for grassland includes pasture and hayland management along with erosion control practices. Land treatment measures and management practices to be applied on forest land will principally involve livestock exclusion, logging and skid trail erosion control, supervised harvest cutting, timber stand improvement, tree planting, and various silvicultural practices.

The land treatment measures and management practices are based on present and projected land uses. If the future land use differs appreciably from that expected, alternative land treatment measures that will accomplish the same purposes will be installed. These changes, if necessary, will be made during project installation and will become a part of the county soil and water conservation district's long-range program.

Soil surveys in the Pine River watershed have been completed. Soil survey information for the Richland County portion of the watershed is available in the Soil Survey Report issued in March 1959. The Soil Survey Report for Vernon County was issued in October 1969.

## Structural Measures

The planned structural measures in Pine River watershed were selected to supplement conservation land treatment measures and reduce flood peaks in the city of Richland Center and on agricultural lands adjacent to the stream. Recommendations by the State Board of Soil and Water Conservation Districts and the Department of Natural Resources were considered in the selection of structural measures.

Two-foot contour interval topographic maps developed from low level aerial photos were used in conjunction with stage-discharge curves to determine the area subject to flooding in Richland Center. These maps were provided by the City Engineer's office in Richland Center.

Information obtained from the city topographic map, U.S. Geological Survey (USGS) topographic maps, aerial photographs, and field investigations provided the basis for the structural feasibility and cost analysis.

The proposed structural measures consist of nine earthfill dams and three dikes and an outlet system. Seven dams will be single-purpose floodwater retarding structures. Two are multiple-purpose sites (MPS) with permanent pools for recreation as well as flood detention storage. The location of structural measures are shown on the project map in appendix E.

Structural works of improvement are a major factor in reducing the flood damages in Pine River watershed. Structural works presented in the plan were selected based on need, physical site location or feasibility, and economic justification. To meet the objectives presented by the local people, these structural works are designed primarily for flood prevention.

Two of the floodwater retarding structures will have wet sediment pools to enhance aquatic wildlife habitat. Two dams are designed to impound permanent lakes for water-based recreation. All impoundment structures are designed to minimize adverse effects on existing fish and wildlife resources. They will control 42.2 percent of the drainage area above the city of Richland Center and, along with the dikes and outlet system, will reduce average annual damages caused by the Pine River in the city by 100 percent based on a 100-year flood.

Based on the primary need for flood prevention, 31 potential structure sites were investigated. From this group 16 feasible sites were selected at the preliminary investigation stage. During preparation of the work plan, various combinations of the 16 structures were analyzed. It was found that the nine structures shown on the project map would most nearly meet objectives of the local people and still fall within economic and environmental constraints.

Location, design, and type of sediment pool (wet or dry) for each floodwater retarding structure was made with consideration given to the wildlife resources of the watershed. The multiple-purpose structures were selected and designed to assure an abundant, high quality water resource for fishing and other types of recreation.

The locations of structural measures and evaluation reaches are shown on the project map. This project formulation was discussed with the local people and it was determined that the proposed watershed protection and flood prevention program would meet their desired objectives.

Foundation conditions at all dam sites consist of a thin layer of medium-yielding silts over a layer of low-yielding alluvial gravels. Based on limited foundation investigations, principal spillways will be designed for yielding foundation conditions.

All dams are designed with the principal spillway crest placed at the 100-year sediment pool elevation. The structures are designed to function for 100 years with routine operation and maintenance. Beyond the 100-year design life, the structures will continue to function at a reduced efficiency. With sediment removal and replacement of deteriorated structural components, the structures will continue to function efficiently for an indefinite period of time.

Principal spillways for structures 7 and 9 are designed to have 24-inch reinforced concrete pressure pipe outlets with single-stage risers. Sites 21 and 33 will have dry sediment pools and 30-inch reinforced concrete pressure pipe outlets and single-stage risers. The principal spillways for sites 11 and 32 are similar but will require 36-inch outlet pipes. Sites 14 controls 12.6 square miles and will require a 5 X 5 foot reinforced concrete box principal spillway conduit. See figure 1, appendix E, for a typical schematic.

Although some rock excavation is anticipated, emergency spillways for all nine structures will be the vegetated earth type.

Flood control provided by principal spillway release and retarding storage reduces the likelihood of emergency spillway discharge to less than a 1 to 3 percent chance. Sites 9, 11, 14, and 21 will have a 2 percent chance for emergency spillway flow and sites 7, 32, and 33 will have about a 3 percent chance for emergency spillway flow.

Fill material for the majority of sites is in adequate supply. Sources of borrow will be crop and pastureland in lower valley slopes, ridgeland, and the flood plain. Borrow has been identified by use of soils maps and onsite sampling. Topsoil will be stockpiled during borrow removal. When the area is closed as a borrow site, the topsoil will be replaced and seeded to a cover crop. SCS policy requires that erosion be minimized at these sites during construction.

Valley slopes furnish loessial silts, colluvial gravelly silts, sand, and clay. Loessial silt, residual silt, clay, and sand are found on the ridgelands. Flood plains contain alluvial silts, sands, and gravels.

The nine structures are designed to store 1,852 acre-feet of sediment during the 100-year evaluation period. This is equivalent to an average of 0.42 inches of erosion from the controlled drainage area. Predicted sediment storage is based on both present and future erosion rates and delivery ratios. It includes the sediment rates anticipated with the land treatment program. Floodwater storage capacity of 19,498 acre-feet is equivalent to 4.38 inches of runoff from the drainage area above the structures.

Detention structures will control 83.4 square miles or 33.5 percent of the drainage area. Of this amount, 79.7 square miles or 42.2 percent of the contributing drainage area above Richland Center will be controlled.

Multiple-Purpose Site 2

MPS 2 is located in the SW¼, sec. 21, T.10N., R.1E., approximately 3 miles southwest of Richland Center adjacent to State Highway 80. The permanent lake will have 50 surface acres with a maximum depth of 44 feet. Drainage area behind the structure will be 3.67 square miles. Stream base flow from five measurements in 1968 ranges from 0.89 to 1.4 cubic feet per second.

The structure will store 803 acre-feet of water for recreational purposes and have a detention capacity, including sediment, of 662 acre-feet.

A detailed geologic foundation investigation of the flood plain detected a medium-yielding layer of silt over a very low-yielding layer of alluvial gravels. The silt layer averages about 6 feet in depth, while the underlying gravel is about 9 feet deep. Average depth to nonyielding bedrock is 11 to 13 feet. The bedrock and water table at both abutments indicate potential leakage. Adequate measures have been included in the structural design to assure stability of the recreational pool level.

The principal spillway will have a 30-inch reinforced concrete pressure pipe with a gated outlet to drain the pool as required to aid in managing the pool as a fishery resource. The riser will be a single-stage concrete monolith.

The vegetated earth emergency spillway is designed to convey floodwater safely around the structure from storm runoff which has a probability of occurring less than once in 100 years.

The minimum life of the structure is 100 years. Principal spillway elevation is set at the desired recreational pool level. Twenty acre-feet allocated to aerated sediment storage during the life of the structure will initially be available to store water for flood detention.

Borrow sites have been sampled and indicate an ample amount of material ranging from poorly graded sand (SP) to silt (ML) to plastic clay (CL). Laboratory reports recommend a zone fill for the best use of available fill material.

The recreational development area for MPS 2 is 213 acres including a 50-acre lake. The location of the recreational facilities is shown on the recreational facilities maps, appendix E. Richland County SWCD intends to purchase an additional 347 acres for an environmental buffer and possible future expansion of recreational facilities. The facilities will be designed to be usable by the physically handicapped.

Multiple-Purpose Site 36

MPS 36 is located in the NE$\frac{1}{4}$, sec 28, and the NW$\frac{1}{4}$, sec. 27, T.12N., R.1E., approximately 11 miles north of Richland Center on State Highway 80. The permanent lake will have 484 surface acres with a maximum depth of 45 feet. Drainage area controlled by the structure is 41.17 square miles. Streamflow at this site was gaged at 29.1 cubic feet per second on April 24, 1969.

Total storage capacity at the permanent pool level will be 8,310 acre-feet. An estimated 7,630 acre-feet of storage area are available for recreational purposes throughout the 100-year life of the structure. The remaining 680 acre-feet will be required to store the 100-year submerged sediment accumulation. Floodwater detention capacity between the principal and primary emergency spillway elevations will be 9,238 acre-feet.

A geologic foundation investigation showed that the dam site consists of a medium- to high-yielding layer of silt and organics over low-yielding layers of alluvial sands and gravels. The structural design is based on removal of the silt layer which averages about 6 feet in depth. Average depth to nonyielding bedrock is 25 feet. Measures to prevent leakage at the abutments have been included in the structural design.

The most conservative criteria to prevent failure was used ("c" hazard class). Proportioning of storage volume at the site versus spillway sizes was used to determine the least costly structural design for the site. It was found that a principal spillway consisting of a 7 feet X 7 feet reinforced concrete box conduit and a two-stage monolithic concrete riser was the least costly alternative. The design includes a gated outlet to drain the pool as required to aid in managing the pool as a fishery resource.

The structure is designed to pass the emergency spillway hydrograph using the principal spillway discharge and reservoir flood storage. The 800-foot vegetated earth emergency spillway will operate only during passage of the freeboard storm.

The minimum design life of the structure is 100 years. Principal spillway elevation is set at the desired recreational pool level. The 108-acre-foot sediment pool allocated to aerated sediment storage during the life of the structure will initially be available to store water for flood detention.

The emergency spillway area will provide up to half of the required borrow. Material ranges from poorly graded sand (SP) to silt (ML) to plastic clay (CL).

The recreational development area will consist of 1,925 acres including a 484-acre lake. The location of the recreational facilities area is shown on the recreational facilities map for site 36. Richland County SWCD intends to purchase an additional 1,078 acres for an environmental buffer and possible future expansion of recreational facilities. The facilities will be designed to be usable by the physically handicapped.

Dikes and Outlet System
Proposed flood detention structures will reduce flooding in Richland Center to one half of its present potential, but a series of earthfill dikes along the Mill Pond in Richland Center are required to provide the city with 100-year protection.

The main dike will be parallel to the east side of the Mill Pond and Pine River for approximately 1.5 miles from State Highway 80 south of Richland Center at the Pine River to a point northeast of State Highway 80 north of town. The dike will have a minimum top width of 10 feet and maximum side slopes of 2½:1 and 3:1. Within these limits the dike will be designed and located to avoid conflict with existing facilities to accommodate recreational or other use of the dike and to enhance esthetics. The maximum height of the dike will be approximately 10 feet, although major portions will range in height from 3.5 to 5.5 feet, including that section located in Krouskop Park. The general location of dikes is illustrated in figure 4.

The Allison Park dike is located north of Richland Center and provides protection to the Allison Park subdivision. The dike is similar to the main dike and is 0.7 miles long.

The southwest dike is located west of the Pine River at County Highway "Q" and is 0.3 miles long.

The dike system has gravity drainage and consists of metal and concrete conduits with flap gates and concrete, vegetal, riprap, and asphalt-lined channel sections. For certain combinations of local and area storms, pumping will be required and is part of the outlet system. Three stationary low head, high capacity, electrically powered pumps with automatic controls and a similar tractor-powered portable unit are planned.

Freeboard from the 100-year flood level to the top of the dike will be 3.0 feet. Foundation conditions are suitable for dikes. Suitable fill material is available.

Existing Reservoir at Richland Center
The existing outlet structure for the Mill Pond dam will be maintained and operated in accordance with an agreed upon operation schedule.

Trout Stream Habitat Improvement
Trout stream habitat improvement features will be installed for a distance of 4.5 miles downstream from floodwater retarding structure 21 on Melancthon Creek and will be implemented as soon as structure 21 is completed to provide flood protection.

Stream improvements will consist of instream devices and streambank stabilization. Instream devices such as bank cover, boulder retards, stump cover, cattle crossings, and gravel for spawning opportunities are proposed. Streambank stabilization includes rock riprapping, sloping, and seeding. (See appendix E, figure 1A.)

Mitigation and Enhancement

The installation of a proposed 484-acre pool at site 36 will result in the inundation of about 260 acres of wetland. About 215 acres of this are type 2 wetlands (fresh meadow); 20 acres are type 3 (shallow marsh); and 25 acres are type 7 (wooded swamp). The permanent pool will create about 15 acres of type 2 (fresh meadow) around its periphery, 20 acres of type 3 (shallow marsh, up to 6 inches of water), 40 acres of type 4 (deep marsh, up to 3 feet of water), and 135 acres of type 5 (open water, up to 10 feet of water). (6)

The Wisconsin Department of Natural Resources has fishing easements on 6,160 feet of stream that will be inundated by MPS 36. The Richland County SWCD will replace these with easements of equal or greater recreational value on Melancthon Creek. Appropriate access will be provided. This acquisition will be completed prior to the commencement of construction on site 36.

Sites 2 and 36 will have wet pools with initial depths of 44 and 45 feet respectively. Public ownership of these pool sites is required. There will be at least a 300-foot-wide strip of public ownership, and a 700-foot-wide conservancy zoning strip around the pools is recommended.

All structures will have modified single-stage or two-stage riser inlets. (See appendix E, figure 1.) The modified inlet will permit the structures to be operated with a wet or dry sediment pool for fish and wildlife purposes. Public access at all wet pools will be assured. Dry pools and fish migration features are planned at sites 9, 11, 14, 21, and 33. Adequate sanitary facilities for expected use have been planned at sites 2 and 36. They will have features enabling use by the physically handicapped.

The watershed plan has been coordinated with the Wisconsin State Historical Society. The installation of the project will not encroach on any known sites of archeological value, historic places, or any area planned for historic preservation by the Society. If artifacts or other items of archeological or historical significance are uncovered during construction, the Wisconsin State Historic Preservation Officer and the National Park Service will be notified. Procedures which comply with Section 106, P.L. 89-665, (16 USC 470 (f)), and Section 1(3) Executive Order 11593 will be followed. This is a Federally assisted local project. There will be no change in the existing responsibilities of any Federal agency under Executive Order 11593 with respect to archeological and historical resources in accordance with P.L. 93-291.

## Operation and Maintenance Provisions

Conservation land treatment measures installed with Public Law 566 cost-sharing will be operated and maintained by landowners and operators. This will be accomplished under a district-cooperator agreement with the soil and water conservation districts. Technical assistance will be available from the Wisconsin Department of Natural Resources, Bureau of Forest Management, in cooperation with the U.S. Forest Service and the U.S. Soil Conservation Service. The Richland and Vernon County SWCD's will operate and maintain all structural and critical area stabilization land treatment works of improvement after they are installed.

Proper operation of the existing Mill Pond outlet structure on Pine River in the city of Richland Center is an important element in the flood prevention plan for the city. Structural works of improvement will reduce and confine flood peaks through Richland Center, but with improper operation, the existing dam can reduce the effectiveness of these measures.

The Richland County SWCD has obtained a commitment from the city of Richland Center that the Mill Pond outlet structure will be operated according to the operation schedule. In essence, one stop log will be removed from each gate when the lake surface rises to within 4.1 feet from the top of the deck. When the water surface comes within 2.6 feet of the deck, an additional stop log will be removed from each gate. All stop logs will be removed when the water surface comes within 1.6 feet from the top of the deck.

The District has obtained commitments from the Richland and Vernon County Boards that they will furnish necessary funds for operation, maintenance, and replacement of all works of improvement installed under this plan. This commitment is in the form of a resolution passed by the County Boards. The sponsoring local organization may enter into agreements with other entities to carry out the operation and maintenance activities.

The sponsoring local organization is responsible for the proper operation and maintenance, without cost to the Federal government, of works of improvement which are installed in part with P.L. 566 funds and for which there will be a continuing need for operation and maintenance. They are also responsible for obtaining all necessary permits.

The structural measures for flood prevention are basically automatic in operation and require no manual operation to achieve the level of flood protection outlined in this plan. In the event that localized flooding occurs inside of the dike, one standby portable pump will require manual attendance. Operation of the gated sediment pools (either wet or dry) will be stated in agreements with the Wisconsin Department of Natural Resources when permits are applied for. Specific items necessary for the operation and maintenance of the works of improvement shall include, but are not limited to the following:

1. Periodic maintenance will be required to insure proper functioning of the structural works including pumps and pump installations.

2. All structures and recreational facilities are to be maintained by making repairs or replacements as needed.

3. Repairs to structures or structural features damaged by floods will be made promptly.

4. Obstructions, trash, and debris are to be removed from the principal and emergency spillway inlets, outlets, drainage collection basins, and other structural works during and/or immediately after storm events.

5. A drainage gradient will be maintained through the dry sediment pools so that no stagnant pools are formed. This must be done to eliminate potential health hazards and mosquito breeding areas.

6. Mowing of the structure sites and sediment pools will be restricted to prevent damage to nesting habitat; however, mowing will be often enough to maintain good grass cover on the structures. In addition, spot control of noxious weeds may be necessary. This could be accomplished by mowing or use of approved herbicides.

Stream habitat improvement features will involve replacement and frequent maintenance to insure effective operation. The Richland County SWCD, who has the responsibility for operation and maintenance, will enter into a separate operation and maintenance (O&M) agreement with the Wisconsin Department of Natural Resources prior to the installation of stream habitat improvement features.

Specific items necessary for operation and maintenance of the trout stream habitat improvement features on Melancthon Creek shall include, but are not limited to the following:

1. Periodic maintenance will be required to insure proper functioning of instream devices.

2. Bank stabilization features are to be maintained by making repairs or replacements as needed.

3. Noxious weeds and woody plants are to be controlled.

4. Obstructions, trash, and debris are to be removed from the stream.

Annual operation, maintenance, and replacement cost of the works of improvement is estimated to be $91,600. This includes $8,900 for flood prevention, $80,000 for recreation, and $2,700 for stream habitat improvement.

The annual operation and maintenance cost for flood prevention includes $5,690 for the seven floodwater retarding structures, $1,200 for the dikes and outlet system (including pump and pipe replacement), and $2,010 for the flood prevention portion of the two multiple-purpose structures.

The annual operation and maintenance cost for recreational development includes $1,740 for the recreation portion of the two multiple-purpose structures and $78,260 for the recreational facilities. The recreational facilities cost includes replacement, equipment, custodians, lifeguards, and a manager.

The stream habitat improvement includes $200 for routine annual operation and maintenance and $2,500 for annual replacement cost of instream devices and bank stabilization.

Vegetation will be established on all denuded areas associated with structural measures. These areas include spillways, embankments, borrow areas, haul roads, work areas, and other areas in need of vegetation. The establishment period will terminate when the Service notifies the Richland County SWCD that vegetative cover is established, but no later than two growing seasons after the initial installation of the vegetative measure. During the establishment period, the State Conservationist may approve P.L. 566 cost sharing for additional work that is required to obtain adequate vegetative cover. However, this work must be done on the same land area that was originally vegetated. This includes the installation of measures such as small erosion control structures, diversions, or tile lines needed to assure the establishment of vegetative cover. Work needed on vegetative measures after termination of the establishment period is considered maintenance and is the responsibility of the sponsoring local organization.

For a period of three years following installation of each structural measure, the Chairman of the Richland County SWCD, President of the Pine River Watershed Association, Chairman of the Highway Committee of the Richland County Board, and a representative of the SCS will make a joint annual inspection. Annual inspections following the third year will be made by the Chairman of the Richland County SWCD, President of the Pine River Watershed Association, and the Chairman of the Highway Committee of the Richland County Board. A report will be sent to the designated SCS representative. Inspections, including a report, will also be made after floods or after the occurrence of any situation which might adversely affect the operation of any of the structural measures. Inspections will cover all portions of each structure, channel below, ponded area above, recreational facilities, and the stream habitat improvement.

The annual and severe storm maintenance inspections will include the determination of vector breeding areas. Those areas caused by the project that might pose a public health threat or nuisance to the public will be eliminated.

The installation, operation, and maintenance of the planned works of improvement must meet the requirements of the Wisconsin Department of Health and Social Services and the Richland County Public Health Nursing Service.

Representatives of the Federal, State, and county governments shall have free access at all times to the structural works of improvement for official activities. All phases of operation and maintenance of these facilities shall comply with applicable local, State, and Federal regulations.

A separate O&M agreement will be prepared for each structural measure. An O&M agreement will be prepared for critical area stabilization land treatment measures. These agreements will contain, in addition to specific sponsor responsibilities for structural measures, specific provisions for retention and disposal of property acquired or improved with P.L. 566 financial assistance. All O&M agreements must be executed prior to the signing of the land rights agreement or the project agreement for construction of structural measures.

Each O&M agreement will contain a reference to the State of Wisconsin Watershed Operation and Maintenance Handbook for Projects Installed With Assistance from the Soil Conservation Service. An operation and maintenance resource conservation plan will be prepared for each structural measure and for critical area stabilization land treatment measures. Technical assistance will be requested from the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources regarding the fish and wildlife aspects of the O&M resource conservation plan for each structural measure.

## Project Costs

The total project installation cost is estimated at $16,934,500 of which $10,000,700 will be paid by P.L. 566 funds and $6,934,800 will be paid by other funds. The total construction cost is estimated at $7,653,900 of which $6,639,600 will be paid by P.L. 566 funds and $1,014,300 will be paid by other funds.

# ENVIRONMENTAL SETTING

## Physical Resources

Pine River watershed is in the central one-third of Richland County and the extreme southeastern portion of Vernon County in southwestern Wisconsin. The watershed is about 28 miles long and has an average width of 9 miles. About 89 percent of the watershed, or 221.5 square miles, is in Richland County and 11 percent, or 27.3 square miles, is in Vernon County.

To the north, the watershed is bounded by the Kickapoo and Baraboo Rivers; to the east, by Willow Creek watershed; to the south, by the Wisconsin River; and to the west, by Mill Creek watershed.

Richland Center, with a population of 5,086, is the largest community in the watershed. It is the county seat of Richland County and is located about 60 miles northwest of Madison, Wisconsin, and about 70 miles southeast of La Crosse, Wisconsin. Yuba, the only other incorporated community in the watershed, has a population of 79. Unincorporated communities in the watershed include Gotham, Bloom City, Twin Bluffs, Gillingham, Woodstock, Rockbridge, and Hub City. Total rural population is approximately 4,800. An estimated 728,000 people live within 50 miles of the watershed. (9)

Pine River watershed lies within the Driftless Area. It is in plan area 3 of the U.S. Department of Agriculture type 4 Wisconsin River basin study. The type 4 study approximates the Wisconsin River plan area of the Upper Mississippi River basin.

The regional land form is in late youth or early maturity with some broad but dissected remnants of rolling ridgeland, steep wooded upper valley slopes with numerous outcrops of sandstone and dolomite, and smooth pastured or cropped lower valley slopes. The flood plains are narrow to broad, with occasional swampy areas and terrace remnants. The flood plain is about 1 mile wide at the mouth of the Pine River. North of Richland Center, it is less than ½ mile wide.

The highest point in the watershed is southwest of Benders Corners in the NW¼ of sec. 27, T.13N., R.1E., at 1,320 feet mean sea level (msl). The lowest point is on the southern boundary along the Wisconsin River at 680 feet msl. The watershed has a maximum relief of 640 feet.

Soils in the watershed have been derived from the weathering of bedrock, wind-blown silt, colluvium, and alluvium interacting with organic materials.

The four general soil associations of the watershed are the soils of the upland ridges, the valley slopes, the terraces, and the valley floors. 1) The upland ridge soil association consists of silty soils found on the ridgetops. These soils, the Dubuque, Fayette, and Downs, are formed primarily from loess that overlies reddish clay. 2) The soils of the valley slope soil association are the Stony land, Norden, Hixton, Boone, Chaseburg, Judson, and Fayette soils.

The areas of Stony land occur on the steeper parts of the valley slopes with many sandstone and dolomite bedrock outcrops. The Norden, Hixton, and Boone soils are generally fine sandy loams that have developed from the underlying sandstone bedrock. The Chaseburg and Judson soils have developed from materials sloughed or washed from higher lying soils. The Fayette soils of the valley slopes are formed primarily from loess. 3) The soils of the terrace soil association are the Meridian, Sparta, Plainfield, Rockbridge, Downs, Bertrand, Tell, Jackson, Curran, Dakota, and Gotham soils. These soils consist of sandy loams of recent and pre-Pleistocene terraces. 4) The soils of the valley floor soil association are Alluvial land, Boaz, Ettrick, Lawson, Arenzville, Orion, and Carlisle muck. These soils are stream deposited except for Carlisle muck which developed from the accumulation of decaying organic matter.

Cambrian and Ordovician, massive to thin-bedded sandstones and dolomite, are the predominant bedrock of the watershed. (See stratigraphic column shown in appendix C.) The bedrock is covered by soils, loess, colluvium, alluvium, and residuum.

The Cambrian formations, the Galesville, Franconia, and Trempealeau, are sandstones with minor amounts of shale and thin-to medium-bedded dolomite.

The Ordovician formations are the Oneota and St. Peter. The Oneota is a thin-to thick-bedded sandy dolomite, dolomite, and dolomitic sandstone. The St. Peter is a massive friable to well-indurated sandstone with minor amounts of shale.

The strata dips gently to the south-southwest and the rock appears horizontal at outcrops except where slumped or settled as a result of weathering and erosion. Faulting (rock fractures and displacement) was not seen during field investigations nor found by subsurface rock coring at six dam sites. The Upper Cambrian Galesville sandstone, which forms an almost continuous valley wall scarp on the main stem of the Pine River above and below site 36, exhibits a pronounced jointing pattern with a fairly uniform spacing of about 50 feet. The joints are predominantly vertical but an occasional joint with an inclination of 22 degrees from vertical was observed.

Mineral resources include sand, gravel, and limestone. The topographic map shows 19 stone, sand, and gravel quarries, and 1 sandpit in the watershed. The value of mineral production in Richland County in 1971 was $215,000 and in Vernon County was $481,000. (1)

Pine River has a humid continental climate, with wide extremes of temperature. January is the coldest month with an average temperature of 18 degrees Fahrenheit ($^{o}$F). The warmest month, July, has an average temperature of 74$^{o}$F. Average annual precipitation is 31 inches. Approximately 70 percent of this occurs during the growing season. The average length of growing season is 150 days. The first fall-killing frost occurs in early October.

Precipitation in the Pine River watershed is of two basic types, cyclonic and convective. Most precipitation occurring in fall, winter, and early spring, (from approximately October 1 through April 30) is caused by the cooling of relatively moist air masses associated with cyclonic air movements (frontal systems). The type of precipitation is usually characterized by low intensity, large areal distribution, and long duration (12-48 hours). Even though significant volumes of several inches may occur, the surface water runoff component is usually small unless it occurs on frozen ground and/or in association with snowmelt. Convectional precipitation results when air near the earth's surface becomes heated, rises, and cools dynamically, causing condensation and precipitation. These thundershower activities which occur mostly in late spring and summer are usually characterized by short duration, high intensity, and cover relatively small areas.

Large amounts of rainfall occurring in a few hours (1-6 hours) can result in large volumes of surface runoff.

Character of precipitation in the Pine River watershed results in two uniquely different flood hazard conditions. One condition occurs when snowmelt, accelerated and augmented by cyclonic rainfall, causes frequent flooding in February, March, and April. These floods are characterized by long duration (usually a week or more) and relatively low peak discharges in relationship to the total volume of runoff.

The second flood hazard condition (condition 2) exists when significant cyclonic precipitation is closely followed by an intense convective storm(s). Flooding which follows is characterized by a rapid increase in stage and high peak discharges in relationship to the total volume of runoff. This combination of meterologic conditions is most likely to occur during June, July, and August.

Locations where the total contributing drainage area is less than 100 square miles usually experience peak annual floods from condition 2. Maximum floods of record are almost always caused by condition 2. When contributing drainage area exceeds 500 square miles the reverse situation tends to occur. In the Pine River watershed peak annual floods are caused by both condition 1 and condition 2, or a combination. Major floods of record in recent years have been caused by condition 2.

Climatological data applicable to the watershed (20) indicates that over 3 inches of precipitation in 24 hours can be expected about once in two years. The greatest amount of rain recorded in 24 hours was in excess of 8.5 inches. Annual snowfall varies from 16 to 88 inches. Winter temperatures as high as 55° F in January and 80° F in March have occurred.

Land use in the watershed and flood plain is as follows:

| Land Use | Total Watershed Acres | Total Watershed Percent | 100-Year Flood Plain Acres | 100-Year Flood Plain Percent |
|---|---|---|---|---|
| Cropland | 55,800 | 35.1 | 6,970 | 38.7 |
| Grassland | 40,500 | 25.4 | 8,030 | 44.6 |
| Forest Land | 57,800 | 36.3 | 2,120 | 11.8 |
| Urban and Built-up | 1,100 | 0.7 | 430 | 2.4 |
| Other | 4,000 | 2.5 | 450 | 2.5 |
| TOTALS | 159,200 1/ | 100 | 18,000 | 100 |

1/ Includes 2,579 acres of type 2; 2,573 acres of type 3; 511 acres of type 4; and 5, 290 acres of type 6; and 1,205 acres of type 7 wetlands. See Fish and Wildlife Circular 39 for explanation of each type.

Pine River has a modified dendritic drainage pattern with six main westerly tributary branches to the main stem and five main easterly tributaries. Each westerly tributary is at least twice as long as its eastern counterpart. The numerous tributaries to the main stem are usually intermittent above an elevation of 1,030 feet msl. Above and below this elevation there are numerous springs and seeps. There are approximately 200 miles of intermittent streams and 200 miles of perennial streams in the watershed. The Willow Creek watershed, with a drainage area of 53,810 acres, also drains into the Pine River watershed. Willow Creek joins the Pine River 5 miles upstream from the confluence of the Pine and Wisconsin Rivers.

The only natural lakes in the watershed are several oxbow lakes at the lower end of the Pine River. Richland Center Mill Pond is an artificial lake formed by a dam on the Pine River within the city of Richland Center. The impoundment is used as a source of cooling water for the Richland Center generating station as well as for recreational purposes, but sediment deposition has greatly decreased its value.

Farm units and the city of Richland Center depend on aquifers of Cambrian sandstone and sandstone and dolomite aquifers of Ordovician age. For other farm uses, shallow dug wells, springs, and permanent streams furnish an abundant water supply.

The surface waters of Richland County are fertile but of good quality. Domestic sewage does not pose a problem. Richland Center, the largest municipality in the watershed, has adequate sewage treatment at present. A small sewage treatment plant located at Yuba is monitored by the Division of Environmental Protection. The Richland Center Mill Pond has dense algae blooms and high rough fish population.

The SCS contracted with the U.S. Department of the Interior, Geological Survey (USGS), to sample and make an analysis of the water quality in Pine River watershed. Grab samples were collected from spring flow (May 14, 1974 and May 14, 1975), summer flow (June 3, 1974 and June 16, 1975), late summer flow (September 9, 1974), and late winter flow (March 19, 1975). For the map showing the sample sites and for preliminary summarized test results from sites 1, 2A, 2B, 36A, and 36B, see appendix C. Sample data for all 25 sites are available at the SCS State Office, Madison, Wisconsin, and the USGS office, Madison, Wisconsin.

The chemical quality of surface water in the Pine River watershed during base-flow periods is similar to that of ground water with respect to major chemical constituents. Surface water at base flow and ground water are both calcium-magnesium-bicarbonate-type waters, with total hardness generally in the range of 200-300 milligrams per liter (mg/l) as calcium carbonate ($CaCO_3$). Concentrations of major ions (calcium, magnesium, and bicarbonate), as well as ions present in lesser quantities (sodium, potassium, chloride, and sulfate) in the surface water generally decrease during periods when surface runoff is entering the streams. The decrease in the concentrations of these ions, as well as a corresponding decrease in dissolved solids concentration and specific conductance, is caused by dilution. Relatively highly mineralized ground water (which constitutes streamflow under base-flow conditions) is diluted by less highly mineralized water derived from precipitation and snowmelt. Dissolved solids concentrations measured in the basin during 1974 and 1975 ranged from near 300 mg/l at base flow to less than 130 mg/l during periods of surface runoff.

The corresponding range of specific conductance values was from 500 micromhos per square centimeter (u mho/$cm^2$) at base flow to around 200 u mho/$cm^2$ during periods of surface runoff. The range of pH values was 7.0 to 8.4 which correlated with the ratio of surface runoff and ground water.

Both pH and alkalinity values reflect a range from "poor" (lower values) to "acceptable" (higher values) as far as productivity of the aquatic community is concerned.

The dilution effect of surface runoff on the common dissolved ionic constituents of the surface water is in contrast to the increases in concentrations of substances normally associated with surface runoff. These substances include organic material, suspended sediment, bacteria, and nitrogen and phosphorus compounds. Surface runoff was a significant component of streamflow during a relatively small percentage of the time ( 10 to 15 percent). It caused substantial increases in the concentration of some parameters and affected their concentrations to varying degrees.

Minimum total phosphorus (P) concentrations measured at each of the sample sites ranged from 0.00 to 0.03 mg/l; maximum values occurred during periods on surface runoff. Total P concentrations on Pine River downstream from Richland Center under base-flow conditions were higher than those found

in the headwaters. Minimum values of total P ranged from 0.06 to 0.10 mg/l and medians from 0.26 to 0.28 mg/l. During periods of surface runoff, values obtained were comparable to those observed at the headwater sites. During periods of surface runoff, about 25 percent of total P found was associated with particulate matter. At base flow, most of the P appeared to be dissolved.

The range of concentrations of various nitrogen (N) compounds was fairly uniform throughout the watershed. Concentrations increased during periods of surface runoff. During base-flow periods, the major nitrogen constituents in the streams were nitrate ($NO_3$) and organic N. The median concentrations of N in nitrate form ranged from about 0.40 to 1.4 mg/l. The median concentrations of N in organic compounds ranged from 0.20 to 0.54 mg/l. The concentrations of N as ammonia ($NH_4$) were low (median concentrations 0.00 to 0.08 mg/l) at base flow. During periods of surface runoff, the greatest increases were in concentrations of N in organic compounds and as $NH_4$. Maximum concentrations of N as $NH_4$ ranged from 0.35 to 4.9 mg/l. Maximum concentrations of N in organic compounds ranged from 0.75 to 5.7 mg/l. Concentrations of N as nitrate also increased during periods of surface runoff, but generally by less than an order of magnitude over median concentration. Median concentrations of N in organic compounds and as $NH_4$ were generally somewhat higher downstream from Richland Center than in the remainder of the watershed. Inorganic nitrogen compounds were generally carried in a dissolved form, but a significant proportion of the organic N transported during periods of surface runoff was associated with particulate matter.

Surface runoff was an important contributor of organic material to streams in the watershed. Concentrations of dissolved organic carbon (DOC) ranged from lows of about 1 to 5 mg/l at base flow to highs generally in the range of 20 to 70 mg/l during periods of surface runoff.

Ranges of color and turbidity values were fairly consistent throughout the watershed. Values of both parameters were low at base flow (generally less then 10 platinum-cobalt units for color and less than 20 Jackson Turbidity Units (JTU) for turbidity). During periods of surface runoff, color values in the range of 100 to 200 platinum-cobalt units were common and turbidities were generally in the range of 20 to 100 JTU's.

Sediment yields in the basin were high, but suspended sediment concentration in streams at any given time were highly dependent on flow conditions. Suspended sediment concentrations were generally less than 40 mg/l at base flow and concentrations of 4 to 10 mg/l were fairly common. During periods of surface runoff, however, concentrations in the range of 200 to 350 mg/l have been measured, and concentrations exceeding 10,000 mg/l could be expected.

Persistent toxic organic compounds (specifically organochlorine pesticides, herbicides, and polychlorinated biphenyls (PCB's)) were not detectable in surface water and bed material in most of the watershed. Where they were detected, they were found in low concentrations. Low concentrations of several

of these compounds were found to be associated with bed material in Pine River downstream from Richland Center. Waters upstream from Richland Center appear to be relatively free of contamination.

Daytime dissolved oxygen (DO) concentrations were high throughout the basin. Median concentrations observed at the various sampling sites were typically in the range of 10 to 11 mg/l. Percent of saturation was generally between 80 and 120 percent, and all DO concentrations measured were greater than 7.0 mg/l, except for the Pine River downstream from Richland Center, where DO concentrations as low as 6.4 mg/l were measured.

Summer water temperatures in headwater streams generally show considerable diurnal fluctuation. Temperature records at sample sites 2A, 2B, 36A, and 36B showed that summer water temperatures in excess of $25^{\circ}$ C were not uncommon, but that these high temperatures usually persisted for only a few hours. Temperatures usually dropped by $5^{\circ}$ to $15^{\circ}$ C from daytime highs to nighttime lows. A temperature range from $8^{\circ}$ to $20^{\circ}$ C is usually considered favorable for cold water fish and biota. Temperature ranges recorded at these sites are probably typical of other sites in the watershed with similar drainage basin characteristics (drainage area, proximity of springs, etc.). Water temperatures ranging from $2.0^{\circ}$ to $20.5^{\circ}$ were measured at visits to water quality sampling stations throughout the basin.

Fecal coliform bacteria are gaining acceptance as an indicator of possible contamination of water by wastes from animals. Concentrations of these organisms found in the basin were highly variable. The highest concentrations did occur during periods of surface runoff, but there was also a considerable range of concentrations during base-flow periods. This is not unusual since the warm-blooded animals that host these organisms have direct access to the stream at base flow, as well as during periods of surface runoff. Inputs of domestic wastes may also be expected to vary with time regardless of flow conditions.

Minimum concentrations of these organisms measured at various sampling stations in the basin ranged from 19 to 870 colonies per 100 ml and maximum values ranged from 360 to 17,000 colonies per 100 ml.

Biological data, including data on algae, bacteria, and benthic invertebrates, showed considerable areal and temporal variation.

Components of aquatic biota that were investigated in the basin include phytoplankton (drifting algae), periphyton (attached algae), and benthic invertebrates.

The periphyton community was permanently attached, making it a good indicator of "average" or longer term conditions at a given location. The periphyton community in the Pine River watershed was dominated by diatoms; this characteristic is typical of small, temperate streams. Periphyton data were used to compute values of the Autotrophic Index (ratio of ash-free dry weight of a sample to its chlorophyll content), which is an indicator of the degree of organic enrichment

present in a storm. Values of the Autotrophic Index that were obtained at each sampling site were highly variable. In general, values indicated that a moderate degree of organic enrichment occurred occasionally at most of the sites, but there were also periods at each site when organic enrichment was very low. No clear seasonal trends could be seen in the values.

The phytoplankton component of the stream biota was also dominated by diatoms; most of the algae comprising the phytoplankton have their origins in the periphyton community. Phytoplankton cell counts ranged from 320 to 11,000 cells per milliliter. Since most of the phytoplankton is derived from the periphyton, it is likely that mechanical detachment of periphyton by current action is a major factor in the range of phytoplankton cell counts. The proportion of "true" phytoplankters (algae not derived from the periphyton) in the phytoplankton was highest on the main stem of the Pine River.

Benthic invertebrates were collected at sample stations 1, 2B, 3, 4B, 7B, 9B, 11B, 14B, 21B, 32B, 33B, and 36B. (See appendix C, table 2.) A summary of the invertebrate data collected is included in appendix 6, table 6.

A reasonably diverse population of benthic invertebrates, including a variety of pollution intolerant organisms, was found at most of the sampling sites. In most cases, however, populations were dominated by a few pollution-tolerant organisms, indicating that environmental disturbances were taking place. Samples collected on the main stem of Pine River downstream from Richland Center showed low diversity and were dominated by a limited variety of pollution-tolerant organisms. Table 7 in appendix C illustrates diversity index and redundancy values for each sample site. The diversity index utilized was proposed by Wilhm and Dorris, 1968. (22)

## Present and Projected Population

Richland County had its population peak at 20,381 in 1940 and has been decreasing since. The "1969 Wisconsin Population Projections" expects this trend to continue over the next 10-year period. The percent change in population between 1965 and 1970 was a -6.82 for Richland County. (9) However, population within 50 miles of the watershed is estimated to increase 27 percent by 1990, from the current 728,000 to 925,000.

## Economic Resources

Land ownership in the watershed is generally private. Publicly owned land includes approximately 1,260 acres by Richland County, 180 acres by the city of Richland Center, 82 acres by the State of Wisconsin, and 39 acres by the Federal government.

Dairying and raising livestock are the most important farm enterprises in Pine River watershed. The major source of farm income is from the sale of dairy products. Principal crops grown are corn, oats, and hay. Wheat, barley, and vegetables are minor crops. Almost all of the feed and grain crops are used within the watershed. General flood-free crop yields per acre are corn, 100 bushels; oats, 65 bushels; and hay, 4 tons.

The 1969 Census of Agriculture counted 1,515 farms in Richland County compared with 2,328 in 1950, a decrease of 35 percent during the 19-year period. Total land in farms decreased 12 percent from 1964 to 1969 but the average size of farm increased about 4 percent (from 198.5 to 206.8 acres per farm). (2) There are 776 farm units in the watershed, the average size farm being about 190 acres. Of these units, 447 or 57.6 percent have cooperative agreements with the Richland and Vernon County Soil and Water Conservation Districts.

Current land values vary according to the type of land. Rough land, pasture, or recreation land is worth an estimated $225 to $300 per acre; cropland costs around $500 per acre; and land in urban areas ranges from $800 to $1,000 per acre. Flood plain zones average about the same.

About 230 farms or 30 percent of the farms in the watershed have land located in the flood plain.

The city of Richland Center is an important agricultural marketing center. The employment arising from various small industrial plants situated there provide a supplemental source of income for farmers living in the watershed.

Small communities scattered throughout the upper half of the watershed are Yuba, Bloom City, Woodstock, Rockbridge, and Hub City. These communities provide goods and services and serve as social centers for inhabitants of the area.

State Highway 80 provides the main north-south thoroughfare north of Richland Center. South of Richland Center, State Highway 80 crosses the watershed in a northeast-southwest direction. U.S. Highway 14 also passes through the southern part of the watershed in a northwest-southeast direction, joins Highway 80 in Richland Center, and continues in an east-west direction west of the city. Numerous town and county roads serve as good all-year transportation routes.

The Chicago, Milwaukee, St. Paul, and Pacific railroad crosses the southern portion of the watershed in a northwest-southeast direction. The railroad ends at Richland Center.

Income levels are considerably below the State average in both Richland and Vernon Counties. In 1969 Richland County had a median income of $7,373 and Vernon County had a median of $6,652 as compared to the State average of $10,068. (2) Richland County has substantial unemployment and is eligible for title IV of the Public Works and Economic Development Act. (18)

The number of residents employed in manufacturing is increasing while the number employed in agriculture or forestry is decreasing. From 1960 to 1970, the number of residents employed in manufacturing in Richland County increased from 771 to 1,280, or about 40 percent. The number of people employed in agriculture and forestry decreased from 2,596 in 1960 to 1,502 in 1970, or about a 42 percent decrease. (2)

Richland County has an age pattern typical for most farm areas; e.g., there are fewer young to middle-aged people and more older people. More young people leave to work and live outside the county. The net outmigration from the county in 1950-60 was 4,109 people. This figure decreased in the 1960-70 period but was still 2,637 people. (2)

## Plant and Animal Resources

Pine River watershed has a number of distinctive natural areas. These areas include sand prairie, sedge meadows, bogs, sand bars, conifer stands, and cliffs. Very few undisturbed natural areas remain in the watershed.

Sand prairies can be found along the railroad and Highway 14 right-of-ways from Lone Rock to Gotham. A large number of prairie plants not found elsewhere in the county grow along the Richland Center spur of the Chicago, Milwaukee. St. Paul, and Pacific railroad from Gotham to County Trunk "O".

Tamarack bogs exist at Sextonville and Hub City. The Hub City Bog, a Wisconsin Scientific Area, contains a number of northern plants otherwise rare in the county. The Sextonville bog contains a variety of communities including cattail marsh; shrub carr; sedge meadow; and lowland forests of elm, silver maple, and ash plus tamarack and some more typically northern plants.

Sandstone cliffs covered with conifers are found along the upper Pine River. White pine is prevalent but red and Jack pine are also found. Red pine occurs only at Rockbridge and Hub City. All three pines occur together only at Rockbridge. The litter of conifer needles plus the underlying sandstone creates an acidic soil on which northern plants, otherwise absent from the county, can grow.

Bluff cliffs are found along the Wisconsin River. Native plant communities grow undisturbed because the steepness of the cliffs makes them inaccessible to livestock and cultural operations.

Dry sandstone cliffs are located at the lower end of valleys. The cliffs west of Hub City have large populations of the fringed gentian <u>Gentianopsis crinita</u> and a cliff variety, <u>Epilobium glandulosum</u> variety <u>perplexans</u>.

Damp, shaded sandstone cliffs are found in the upper reaches of the watershed. The plants found on these cliffs have played a part in theories on glaciation. <u>Sullivantia renifolia</u>, the sword moss <u>Bryoxiphium norvegicum</u>, <u>Adoxa moschatellina</u>, and <u>Lycopodium selago</u> variety <u>patens</u> are found on these cliffs. The

cliffs west of Hub City have a number of northern plants including Phytolacca americana and Jeffersonia diphylla which are at the extreme northern edge of their range.

Only about 200 out of 160,000 acres of originally undisturbed maple woods are left in the county. The Pier Spring woods is one example. This woods shows the maple to oak gradation according to the exposure of the slopes. (5)

Most lowland woods have been pastured. Some areas of silver maples, swamp white oak, and button bush wood are still found along the Wisconsin River.

Jack pine woods are found between Lone Rock and Gotham. This is about the southermost limits of the range for jack pine.

The lower Pine River and the oxbow lakes along the Wisconsin River support panfish, large and small mouth bass, northern pike, walleye, and catfish. This fishery is typical of most of the other warm water streams and lakes in southwestern Wisconsin.

Portions of the Pine River above Richland Center and most of the major tributary streams provide a cold water fishery. Approximately 50 stream miles in the watershed are classified by the Wisconsin Department of Natural Resources as trout waters. (See tables 8 and 9 in appendix C.)

All Wisconsin trout streams are classified into three categories. Class I streams are high grade trout water with conditions favorable to natural reproduction. No stocking with hatchery fish is required or permitted. Class II streams have native trout, but generally require some stocking to use available food and space. Recently streams in this category have been further differentiated into IIA and IIB subclasses. The presence or absence of good spawning areas determines a stream's subclass. Subclass A streams provide the more favorable spawning conditions. Class III streams provide marginal trout habitat. Stocking of legal trout is necessary to provide trout fishing.

The most recent edition of Wisconsin Trout Streams published by the Wisconsin Department of Natural Resources in 1974 identifies 13 stream segments in the Pine River watershed as trout waters. With the exception of a 5-mile reach of Pine River, all of the waters listed are Class II trout streams. The following table shows the trout waters of the Pine River watershed by their classification as listed in the 1974 edition of Wisconsin Trout Streams:

| Class IIA 1/ | Class IIB 2/ | Class III |
|---|---|---|
| Ash Creek | Basswood Creek | Pine River |
| Fancy Creek 3/ | Gault Hollow Creek 3/ | |
| Grinsell Creek | Johnston Creek | |
| Hansel Creek | Pine River | |
| Hawkins Creek | West Branch of Pine River | |
| Melancthon Creek | Horse Creek | |

1/ Recent fish surveys conducted by the Wisconsin Department of Natural Resources will probably result in the addition of Pier Spring Creek as a Class IIA trout stream.

2/ Recent fish surveys conducted by the Wisconsin Department of Natural Resources will probably result in the addition of the following waters as Class IIB trout streams: Brush Hollow Creek, West Branch Marshall Creek, and Hynek Hollow Creek.

3/ The classification of these waters will probably be changed as a result of recent fish surveys conducted by the Department of Natural Resources. See narrative.

Recent fish surveys conducted by the Wisconsin Department of Natural Resources will probably result in the following changes in trout stream classification within the Pine River watershed: Basswood Creek will be classified as Class IIA rather than IIB trout waters; an upper 1 mile segment of Fancy Creek will be classified as Class I with remaining waters classified as IIB trout waters (currently Fancy Creek is classified IIA); Gault Hollow will be classified IIA or I trout water rather than IIB. Recent surveys will also result in the following additions: Brush Creek, West Branch Marshall Creek, South Branch Marshall Creek, Marshall Creek, and Hynek Hollow as Class IIB trout waters. The Marshall Creeks were formerly unnamed tributaries of Fancy Creek. Finally, Pier Spring Creek will be listed as a IIA trout stream.

A fish inventory done by the University of Wisconsin at Stevens Point collected 20 species of fish at two sample sites in the watershed. (7) The sites were on the Pine River above Melancthon Creek and on Ash Creek.

During the survey, one specimen of the red side dace (Clinostomus elongatus) was found in the Pine River near Melancthon Creek. This species, which prefers clear, cool, flowing water with a gravel or sandy bottom, is very sensitive to turbidity. In 1975 it was included on "Watch status" by the Wisconsin Department of Natural Resources. During a survey made by Becker in 1966, the red side dace was described as being locally abundant in tributary streams of the Pine River.

Of the species collected at the Pine River sites, white suckers were most numerous (37 percent of the total); creek chubs ranked second (22 percent of the total); and blacknose dace were third (10 percent of the total). Brown and rainbow trout comprised 3.4 percent of the total.

On Ash Creek, blacknose dace were most abundant (44 percent of the total); the central stoneroller ranked second (30 percent of the total); and creek chubs ranked third (10 percent of the total). Brook trout were collected at one site, comprising less than 1 percent of the total.

Wildlife habitat conditions are above average because of the excellent interspersion of woodland, brushland, cropland, and odd use areas. Good populations of white-tailed deer, fox and grey squirrels, cottontail rabbits, raccoon, woodcock, and ruffed grouse are present. Waterfowl use is heaviest during migration periods. Mink, beaver, river otter, and muskrats provide trapping opportunities.

Fish and wildlife resources in the Pine River watershed are generally abundant and are highly valued.

Two species of reptiles and one species of amphibian are found on the changing status list. This means that they may or may not be holding their own at the present time. These species include the swamp rattlesnake or massasauga, six-lined racerunner, and the bullfrog.

One species of mammal, the white-tailed jackrabbit, is considered to have changing status.

Several species of birds that occasionally visit the watershed are also found on the changing status list. The barn owl, Bewick's wren, Cooper's hawk, red-shouldered hawk, and the upland plover have been declining in numbers. The bald eagle is an endangered species and chances for survival are small. (11)

## Recreational Resources

Water-based recreation includes fishing, swimming, trapping, boating, and canoeing. Since there are only a few small oxbow lakes and impoundments in the watershed, these activities take place mainly on the streams. Pollution and sedimentation have lessened the esthetic enjoyment of some of these stream activities. Limited public access, flooding, and restricted access through privately owned lands also hinder the use of streams for water-based recreation. This is evidenced by results of a 1970 recreation survey conducted by the Wisconsin Department of Natural Resources. Per capita participation rates for water-based recreation activities in Richland County (swimming, canoeing, motor boating, and water skiing) are among the lowest recorded in the State. The 1974 Richland County Outdoor Recreation Plan confirms needs for additional beach, boating,aand water skiing opportunities.

Swimming is limited to pools because of the lack of beaches. The Wisconsin River may be used for swimming but sandbars and swift undercurrents make it hazardous. Krouskop Park in Richland Center has the only public swimming pool in the watershed. In addition to the pool, park facilities include baseball,

softball, and football fields; general play areas, picnic tables and grills; 3 picnic shelters; playground equipment; horseshoe courts; hockey and skating facilities; a bandstand; and restrooms. Plans have also been made for tennis courts. The park is 35.4 acres in size.

There are many good areas for hunting and trapping because the watershed is forested and has many wetland areas. There are few public hunting areas. The Department of Natural Resources provides 3,082 acres for hunting purposes but most hunting occurs on private lands. (15) The Department of Natural Resources also has 2.6 miles of fishing easement with appropriate public access in the Pine River watershed.

Land-based activities such as camping, picnicking, golfing, sightseeing, horseback riding, hiking and nature study, snowmobiling, hunting, cycling, and skiing exist in the watershed. The Wisconsin Water Trail provides for good sightseeing along the lower edge of the watershed.

The Richland County Outdoor Recreation Plan - 1974 - lists picnic tables and swimming beach areas as recreation needs. Campsites, golf courses, and canoe stream miles are in adequate supply.

## Archeological and Historical Values and Unique Scenic Areas

The National Register of Historic Places (Federal Register, Vol. 40, No. 24, February 4, 1975) has no listing for the area. In the publication Wisconsin Scientific Areas, the Scientific Areas Preservation Council lists the Hub City Bog as a natural area set aside for preservation. The bog is 55 acres in size and located ½ mile north of Hub City, east of Highway 80. It is owned by the University of Wisconsin and features a tamarack bog with a reach of trout stream. (13) The area was evaluated by the National Park Service for listing in the National Registry of Natural Landmarks, but has not been found to be nationally significant.

An archeological survey was conducted on July 7 through July 19, 1975, in accordance with a cooperative agreement between the Soil Conservation Service and the State Historical Society of Wisconsin. The land within the proposed flood pools and permanent pools of multiple-purpose sites 2 and 36 was examined. The total area to be affected by site 2 was surveyed while only a portion of the area to be affected by site 36 was surveyed in the time available.

For structure site 2, there is one area where prehistoric material has been found within the permanent and flood pools. This area is in a corn field in the flood pool area and it is likely that the original areas of occupation have been disturbed by plowing. Within the area examined at structure site 36, cultural material was found at 24, possibly 25, different locations. Two of these sites were too extensively disturbed to yield significant information.

The sites surveyed were in the flood and permanent pools. It is recommended that an archeological survey of the area around the pool at site 36 be undertaken before developmental plans are finalized so that archeological resources can be preserved without interfering with development.

A preliminary archeological reconnaissance of the remaining sites did not disclose any obvious areas of cultural significance. The State Historical Society of Wisconsin has been contracted to do additional archeological investigations on remaining sites during 1976.

The State Historic Preservation Officer has determined that there are no buildings or other structures eligible for inclusion in the National Register of Historic Places which would be effected by the proposed project.

The Economic Profile for Richland County reports the Wisconsin Water Trail along the lower portion of the Wisconsin River and the natural sandstone bridge near Rockbridge as sites of special interest. The natural bridge has a 12-foot arch and a span of 20 feet. (2) The Wisconsin Water Trail provides scenic viewing of cliffs, bluffs, and sandbars along the Wisconsin River.

Wisconsin's Historic Preservation Plan mentions the A.D. German Warehouse in Richland Center on U.S. Highway 14 as being of historic value. The structure, which is listed in the National Register of Historic Places, would not be effected by the proposed plan.

A Wisconsin State Historical Society study done in 1909 found Indian camps in Bloom Township and a small village with effigy mounds in Henrietta Township.

## Soil, Water, and Plant Management Status

The Economic Profile shows a downward trend in the amount of farmland and an increase in the average farm size. The average cropland per farm is increasing, indicating a trend toward consolidation of smaller farm units.

The Vernon and Richland County SWCD's have been active in conservation and resource planning. The soil and water conservation districts have cooperative agreements for land treatment with 447 out of 776 landowners. Cooperators have conservation plans on 62,107 acres, or 39 percent of the watershed.

The percentage installed to date of some needed land treatment measures as a result of existing resource conservation plans are as follows: contour stripcropping, 81 percent; critical area planting, 65 percent; diversions, 58 percent; grassed waterways or outlets, 28 percent; timber stand improvement, 56 percent; livestock exclusion, 18 percent; and tree planting, 53 percent. Conservation cropping systems are being followed on 96 percent of the cropland that is under resource conservation plans. About 73,300 acres of land in the watershed are adequately protected.

## Projects of Other Agencies

Several projects were considered in planning the Pine River watershed project.

The LaFarge project by the Army Corps of Engineers on the Kickapoo River is about 25 miles west of the Pine River watershed in Vernon County. The authorized project is already partially constructed (1/3 of the $38.5 million), but temporarily suspended because of controversy. Several alternatives to the proposed lake have been suggested. They include flood plain evacuation of 39 businesses and 29 homes in the villages of Ontario, LaFarge, Readstown, Viola, Soldier's Grove, Gays Mills, and Steuben; the elimination of the recreation lake in favor of a dry dam; and other measures which would provide only partial flood protection to the area. The Corps states that the lake, if built, will "destroy scenic and biological values in 12 miles of the river above LaFarge but it would improve fishing downstream and make recreation available to up to a million visitors a year". (3) The effect of the Corps project on the number of recreational visits to the Pine River sites will depend on the alternative selected. The recreational use analysis was based on the assumption that the LaFarge lake would be installed as originally planned.

If the LaFarge Lake is not installed as originally planned, there will probably be an increased recreation use demand in the Pine River watershed, particularly at the site 36 recreational development. Actual recreational use in the Pine River watershed will be limited by the facilities provided so as to prevent environmental degrading by overuse.

The Soil Conservation Service Tri-Creek watershed project in Monroe County has a proposed recreational lake. This site (Tri-Creek, site 3) near the Elroy-Sparta bicycle trail, is about 50 miles from the proposed recreational site 36 (Pine River).

The Scientific Areas Preservation Council lists several high priority areas in the watershed which need to be preserved by purchasing. These areas include the cliffs west of Hub City, the Pier Spring woods, and the Gotham jack pine woods with the associated sand prairie and sand blows. Two other areas, which should be preserved, include the prairie right-of-way along Highway 14 and the railroad from Lone Rock to Gotham and the railroad right-of-way from Gotham north to County Trunk "O". None of these areas would be effected by the proposed plan.

The new sewage treatment plant serving the city of Richland Center was considered in plan formulation. The plant facilities which were completed in 1974 are protected from the 100-year flood level on Pine River, but the outfall facility would be submerged causing backup into the plant. Depth of submergence is approximately the same with or without the dikes in place. The internal drainage system associated with the dike would provide a temporary gravity outlet for the treated sewage effluent during times that the primary outlet would be submerged by flooding in the Pine River.

The Bureau of Outdoor Recreation and Forest Service are conducting a study of the Wisconsin River as a potential addition to the National Wild and Scenic Rivers System. It has been determined that the Wisconsin River below Sauk City qualifys as scenic and/or recreational.

The steep topography of the Driftless Area causes fast runoff resulting in serious flooding, erosion, and sediment problems. Good quality and easily accessible water-based recreational facilities are needed to satisfy local and regional demands. There is also a need to improve and maintain surface water qualtiy. The diversity and quality of fish and wildlife habitat is threatened by poor resource management.

Drainage problems are minor and local in nature. There is limited potential for irrigation in the watershed. Those areas that have potential for irrigation have supplies of good quality ground water available. The quantity and quality of municipal and industrial water supply is adequate.

## Land and Water Management

Land treatment needs include the orderly removal of surface runoff, control of all forms of erosion to reduce undesirable sediment accumulation, preservation of soil fertility, and increased infiltration of water to maintain a desirable soil-water relationship. Some landowners are financially capable of installing needed land treatment measures, but financial assistance will be needed for implementation of a complete land treatment program. Receipts from farm marketings in Richland County averaged $18,150 per farm in 1970, 17 percent below the State average. Thirty percent of the farm operators in Richland County worked off the farm 100 days or more in order to supplement their farm income. In 1969 the average value per farm in Richland County, including land and buildings, was $31,000. The State average was $42,450. The Richland County average value per agricultural acre was $152, and the State average was $232. (19)

Although low fertility is not yet a serious problem, topsoil depths are shallow and cropland sheet erosion rates need to be reduced from the present average of 4.4 to 2.5 tons per acre per year to maintain productivity. One of the greatest needs is to achieve reductions in cropland sheet erosion through land use adjustments and management practices.

## Floodwater Damage

Severe floodwater damage in the city of Richland Center and frequent flooding of cropland and pastureland are problems in Pine River watershed. Past floods have destroyed crops; washed out roads, bridges, and fences; damaged buildings; and deposited debris on cropland and grassland. The city of Richland Center is particularly susceptible to floodwater problems causing damages to private residences, business establishments, small manufacturers, and public facilities.

The Allison Park area - Richland Center, 1965.

About 18,000 acres of agricultural land in the 100-year flood plain are subjected to flooding which reduces productivity (see appendix E, figure 5). Frequent flooding forces farmers to place prime agriculture land in pasture. Flooding also has an adverse effect on milk production because it interrupts feeding, milking routines, and milk transport. In addition, it takes from 2 to 5 weeks to recover full production.

Flooding at Krouskop Park, 1965.

Historic records and information from local residents indicate that portions of the flood plain are inundated annually and that in recent years severe floods occurred in 1935, 1942, 1951, 1952, 1956, 1960, 1966, 1969, and 1972. The 1951 flood occurred in July following a 4-inch rain of only 3 hours duration. It is estimated that this storm produced a 100-year frequency flood in some portions of the watershed. Because of the short duration of rainfall and its areal distribution, the estimated magnitude of flood frequency in lower portions of the watershed was considerably less. In Richland Center over 200 homes, many business places, and several small manufacturing plants were flooded. In several cases boats were used to remove families from their homes. The city's sewage treatment plant was completely submerged and rendered inoperative for 3 days following the flood.

Flooding of commercial property - Richland Center, 1936.

In addition to urban damage, crops in the flood plain were almost a total loss. Land was heavily silted and many farm fences were completely destroyed. Most rural roads in the flood plain were temporarily closed because of washed-out bridges and culverts and damaged roads. Total damage in the flood plain from the 1951 flood is estimated at $575,000.

Residential flooding - Richland Center, 1951.

In July 1956, extremely heavy but local rains, estimated from 4 to 6 inches by residents, occurred in several valleys of the watershed. Unharvested crops were destroyed and roads, bridges, farm fences, and buildings were damaged. Although flooding occurred in Richland Center, the effects of localized rainfall resulted in less floodwater damage than that experienced in 1951.

The old Richland Machine Works - Richland Center, 1936.

Flood damage to corn near Richland Center, 1972.

The 1951 and 1956 flood events are described as follows:

The Richland Democrat, July 26, 1951

"Richland Center, along with practically every community in central and west Richland County, is still licking wounds inflicted over the weekend when the worst flood in the community's history followed a four inch fall of rain early Saturday morning. . .

Richland Center took a real blow in the chin, too, as the water rose to heights never before recorded. No less than 200 homes had basements flooded and some homes in the second ward had heavy pieces of furniture and appliances banged about and tipped over as waters rushed two and three feet deep through the buildings. . .

As early as 8: 30 that morning a call had gone out from the Democrat to Dosch's Corners where the information came back that water was already pouring into their home. At Gillingham information was secured that showed that the water covered all of the valley, and farmers were having great difficulty in getting cows from pastures for milking. . .

Breaking of the dike at the dam released a great flood of water that poured over the area of the veterans housing project and on south-west through the residential area south of Seminary Street. It ripped out foundations, it tore through homes and the Weeden Grocery in that area, and it effectively halted all traffic that up to that period had been successful in reaching the city over Seminary Street. The angry waters were just as devastating in their effect as they were effective in covering everything with which they came in contact with a thin layer of slimy, stinking mud. . .

The waters coursed through the business district west of Main Street and smashed or carried away any obstacle that ordinarily would have withstood a bad storm's damage.

Railway roadbeds were badly washed, logs and telephone poles were carried far from their pilings, and the city's sewage treatment plant was effectively put out of commission for three days as it was entirely submerged by the onrushing waters. . .

Traffic was also halted on Highways 56-80 north of the city for several hours when the approach to the bridge at Horse Creek was washed away. The county highway department hauled in enough dirt to fill the hole that caused the cave-in of the concrete paving. . .

Many rural roads were temporarily closed because of washed out bridges and culverts, far too many to enumerate as the heavy rainfall rushed down small gullies and washed out many such structures."

The Richland Democrat, July 26, 1956

"Extremely heavy but local rains, estimated from 4 to 6 inches by residents, and hail hit four valleys in the county last Wednesday night and left in the wake severe damage to roads and bridges and unestimated destruction to farm crops, livestock, and buildings. . .

Mrs. Jim Brooks said that most of the milk had to be hauled that morning in pick-up trucks and that a great number of the cans had to be handed across bridges that were washed out. At one place they couldn't get it at all because the bridges on both sides of the farm were completely gone.

The Horse Creek area suffered from both floods and the hail. Again the water was reported higher than in the flood of 1951. Several of the bridges were washed, including the big one over County Trunk A near the Rose Balsley and Roy Bannister farms, where emergency repairs had to be made to allow traffic to move.

The road there was covered with sand wash which in places was more than a foot thick. . .

At the Mills Wanless farm, water came almost up to the barn. Five pigs were carried away and only one has been located since. It flooded Wanless' bottom land and took out all of the fences with it.

The complete damage is hardly estimable. Many of the farmers hit have considered putting the fields into the soil bank and discing down the crops. Some may be able to come back and some of the farmers are expecting to make silage out of both the corn and oats that were damaged.

The damage to roads and bridges was extensive, and will be reflected in tax rates throughout the towns of Sylvan, Dayton, and Marshall in the future years."

The July 26, 1951, flood was the key historical flood studied. A flood of this magnitude, which caused an estimated $500,000 damage in Richland Center alone, has a 10 percent chance of occurring in any given year in the Richland Center area.

An analysis of flood frequencies indicate that total primary damages from floodwaters on an average annual basis is approximately $661,200. Approximately $269,900 of this amount occurs as urban damage to the city of Richland Center and the communities of Hub City and Rockbridge. The remaining $161,000 is from crop and pastureland, $25,500 from other agricultural land, $97,900 from road and bridge damages, $15,200 from sediment deposition in the Mill Pond, and $91,100 in indirect damages.

## Erosion Damage

Upland sheet erosion was quite severe in this area during the 1930's. Since that time, a continuing and expanding land treatment program has reduced this damage considerably. Additional land treatment measures are needed and will be installed during the project period.

Sheet and rill erosion in the watershed is estimated to be 558,100 tons per year. This occurs on the following lands with average annual soil losses as follows: cropland, 216,000 tons; grassland, 96,900 tons; and forest land, 245,200 tons.

Healed gullies in the upland are numerous. There are gullies in the watershed that have active head cutting. Some have been corrected by terraces and grade stabilization structures, but additional grade stabilization structures are needed on individual farm units to control this problem.

Streambank and road ditch erosion are prevalent in the watershed and require critical area treatment and grade stabilization structures. Streambank erosion will be lessened through the control of floodwaters. Evaluation of erosion was based on field observations. Detailed studies of upland sheet erosion were made of the watershed areas where floodwater retarding structures are proposed.

## Sediment Damage

Sediment damage to cropland and pasture in the flood plain is considered to be inseparable from floodwater damage. Historically, such damages have been significant, but land treatment and soil-conserving tillage practices have reduced sediment deposition in the agricultural flood plain.

Sediment deposited in the Richland Center Mill Pond has reduced the storage capacity. Water from the Mill Pond is used to cool the electrical generating plant.

## Recreation

There is a definite need for recreational facilities in the vicinity of Richland Center. Although the Wisconsin River flows 11 miles south of the city, diversified recreational facilities there are limited. Because of the absence of lakes, recreational activities are mainly stream or impoundment oriented. Major water-based recreational facilities within a 30-mile radius of Richland Center are the Wisconsin River, Lake Redstone, Blackhawk Lake, Plain Honey 3, West Fork of the Kickapoo, and Governor Dodge State Park. However, many recreationists cannot be accomodated by these facilities during peak use. Based on Wisconsin Department of Natural Resources accessibility maps, the one-hour accessibility to the recreation sites will increase from 150,000 in 1970 to 175,000 in 1990, or about a 14 percent increase.

## Plant and Animal

Water management for fish, wildlife, and recreational purposes is needed in the watershed and has been given high priority by the watershed association.

A trout fishery exists in streams north and west of Rockbridge and Gillingham. These streams include the Yuba and Bloom City branches of the Pine River, Melancthon Creek, Fancy Creek, and Hawkins Creek.

Some portions of quality trout water have deteriorated because of mismanagement of land and water resources and the deposition of sediment in the stream channel. Gravel spawning beds are covered with sediment and debris, leading to generally poor trout survival.

Even though high ground water recharge in recent years and the trend toward purchase of small farms for recreation purposes have tended to improve water quality in the basin as a whole, localized mismanagement is imposing severe limitations on trout habitat. This situation, which usually involves feedlots, barnyards, and direct livestock access to trout streams, occurs on all major and most feeder streams in the Pine River watershed.

Populations of most upland game species have declined because of limited nesting and winter cover. The destruction of farm and roadside hedgerows has reduced prime habitat for a number of species.

Several species of animals in the watershed are found on the changing status list as of this date. These species include the following animals: swamp rattlesnake, six-lined racerunner, bullfrog, white-tailed jackrabbit, barn owl, Bewick's wren, Cooper's hawk, red-shouldered hawk, and upland plover. The bald eagle is listed as an endangered species whose chances for survival are small. (11)

Some rare and endangered plants, such as the purple cliff brake, ground pine, and beech fern, may exist in the watershed. Increased emphasis on conservation and exclusion of livestock has increased the chances for survival of rare, endangered, and uncommon plant species.

## Economic and Social

In both Richland and Vernon Counties the percent of the population engaged in agriculture in 1969 was well above the State average. Vernon County had 31.5 percent and Richland County had 24 percent compared to the State average of 6.5 percent. The average sales per farm was below the State average by 2 to 4 percent. Also, a fair number of operators for each county (660 in Vernon County and 455 in Richland County) worked off their farms a total of 100 days or more to supplement income. (2) Both Vernon and Richland Counties are listed as areas of substantial unemployment and are eligible for title IV of the Public Works and Economic Development Act. (18) Areas subject to agricultural flood damage are devoted to family farms using less than 1½ man-years of hired labor. Most are low-income-producing units.

There is a need for rural community development in and around the watershed. Additional employment opportunity along with increased operating efficiency is needed to provide incentive for the younger adults to remain on the family farm.

A threat of loss of life by drowning during floods exists in Richland Center.

## Other Problems

Other problems related to water management include a buildup of natural levees along the streams which cause poor drainage on adjoining lands.

Drainage from septic tanks in small unincorporated villages could reach the ground water causing a pollution hazard. A small sewage treatment plant located at Yuba could be a potential pollution problem and is monitored by the Division of Environmental Protection. High fertility and pollution are problems with the Richland Center Mill Pond as are dense algae blooms and high rough fish populations.

The major sources of surface water pollution are sediment, feedlot runoff, and wastes from cheese factories. The following table lists point sources in the watershed that are potential sources of pollution. (15)

| Source | Effluent | Location | | Section | Stream |
|---|---|---|---|---|---|
| | | Town | Range | | |
| Richland Center Dump | drainage | 10N | 1E | 17 | Pine River |
| Richland Center Sewage Plant | sewage | 10N | 1E | 20 | Pine River |
| *Gillingham Cheese Factory | dairy wastes | 11N | 1W | 14 | Fancy Creek |
| *Rockbridge Cheese Factory | dairy wastes | 11N | 1W | 10 | Pine River |
| Yuba Sewage Plant | sewage | 12N | 1E | 7 | Pine River |
| *Bunker Hill Cheese | dairy wastes | 12N | 2E | 28 | McGlynn Creek |
| Richland Center Foundry Company | indust. wastes | 10N | 1E | 28 | Pine River |
| Richland County Senior Citizens Home | sewage | 10N | 1E | 34 | Pine River |
| Yuba Cheese Factory 1/ | dairy wastes | 12N | 1E | 7 | Pine River |

1/ Yuba Cheese factory is currently being used as a holding station and produces no waste effluent.

*Plants which have created problems in the past.

RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

Richland Center has enacted a flood plain zoning ordinance. Over 30 variances to the ordinance have been granted. Few residents of Richland Center are participating in the Housing and Urban Development Flood Insurance Program. A flood warning system and evacuation plan has been implemented by the city.

The Vernon and Richland County shoreline and flood plain zoning ordinances regulate and restrict flood plain developments in the rural areas of the watershed.

The authority to improve water quality by control of industrial and agricultural point source pollution comes under the jurisdiction of the Wisconsin Department of Natural Resources.

Chapter 92.09 of the Wisconsin Statutes states that "The supervisors of any soil and water conservation district may formulate proposed regulations for the use of lands lying within the district but outside of the limits of incorporated cities and villages. . .". No land use regulations under this authority have been enacted.

# ENVIRONMENTAL IMPACTS

## Conservation Land Treatment

Land treatment measures on upland watershed areas will reduce sheet and gully erosion, thereby reducing the sediment load delivered to the Pine River. Water retention capability of upland areas will be increased, resulting in an overall reduction in surface runoff volume. Land treatment practices in the flood plain, including critical area stabilization, will reduce channel erosion and scour. This will result in stabilizing the existing channel and improving the wildlife habitat.

All types of erosion will be reduced allowing valuable agricultural land to remain in production. It is estimated that in the 8-year installation period, the land treatment measures to be installed will reduce sheet and rill erosion by an overall watershed average of 1.1 tons per acre per year.

Damage from sedimentation will be reduced. Reduction in erosion will be accompanied by a corresponding reduction in sedimentation. Land treatment practices will reduce sediment deposition in the Richland Center Mill Pond by approximately 5,200 cubic yards annually.

The ground water table and ground water recharge will be increased by the land treatment. Runoff will be reduced, allowing time for the water to percolate through the permeable soils to the ground water table. This may raise the water table but should not have any adverse effects on the watershed.

Productive land, a prime national resource, can be used more wisely and within its capability. Agricultural production of crops required to support the basic economy of the watershed community will be maintained.

Proposed forest land treatment measures will improve the hydrologic condition of the forest land. This will have the effect of reducing surface storm runoff with a subsequent decrease in sediment yield. Also, proper management, protection from grazing, and continued fire protection will increase the productivity of the forest land in the watershed.

Cost of operating and maintaining structural works of improvement will be reduced by the installation of land treatment measures above structure sites.

Wildlife habitat will be preserved and protected. Existing habitat will be improved and increased by such practices as small spot plantings of trees and restricted mowing at dam sites.

The land treatment practice of excluding livestock from forest land and streambank will be included on 17,200 acres in the watershed. The Soil Conservation Service will provide technical assistance to fence 4,300 acres and the Forest Service will provide technical assistance to fence 12,900 acres. This fencing will reduce the erosion from woodlots and streambanks and will enhance their

appearance by allowing ground cover to grow. The increased ground cover will provide food and habitat for wildlife.

Small on-farm floodwater retarding structures located throughout the upland areas of the watershed will reduce sediment delivered to perennial streams, stabilize the land resource, provide localized flood protection, and provide edge effect for wildlife. They also help reduce non-point source pollution both by preventing polluted sediments from reaching the stream system and by reducing flushing of barnyards and pastures from overbank flow. Approximately 25 percent of the structures will be located on forest land, 25 percent on grassland, and 50 percent on cropland. The typical structure will require approximately one-half acre of land for the dam and spillway and an additional 2 to 3 acres for sediment and floodwater storage. These small structures, which are designed to reduce peak flows at the site, will be located to minimize adverse impacts on existing land use. An aggregate total of approximately 50 acres of forest land, 50 acres of grassland, and 100 acres of marginal cropland will be replaced by structures and spillways. Existing land use will be modified on a total of about 250 acres of forest land, 250 acres of grassland, and 500 acres of marginal cropland subjected to occasional short duration flooding in the sediment and flood pools. During construction, some increase in sediment is anticipated.

Floodwater damages to the city of Richland Center and sediment deposition in the Richland Center Mill Pond will be reduced through abatement of runoff and erosion.

Installation of the proposed land treatment measures during the project period will provide on-site benefits on approximately 24,000 acres of cropland and grassland and on 32,500 acres of forest land. The total acreage receiving on-site benefits, 56,500, is about 35 percent of the 159,200 acres in the watershed.

## Structural Measures

The combined program of land treatment and structural measures will substantially reduce floodwater and sediment damage in the Pine River watershed. The watershed was divided into 18 agricultural reaches and 1 urban reach for evaluation purposes. See the project map, appendix E.

Direct average annual urban floodwater damage caused by the Pine River up to the 1 percent chance of occurrence in Hub City, Rockbridge, and Richland Center will be reduced from an estimated $269,900 to none, or a reduction of 100 percent. Construction of proposed floodwater detention reservoirs and dike system will reduce direct average annual floodwater damage caused by the Pine River in Richland Center from an estimated $266,500 to none.

Areas subject to flooding, with and without works of improvement, are shown on the urban flood plain map in appendix E.

About 42 percent of the drainage area above Richland Center will be controlled by structures. Detention volume in the structures allocated for sediment storage should reduce annual sediment accumulation in the Richland Center Mill Pond from 30,650 cubic yards to 22,590 cubic yards. The combined effect of structures and land treatment will reduce sediment deposition in the Richland Center Mill Pond to nearly one-half of the current annual rate. This will facilitate restoring and maintaining the Mill Pond for future use.

Richland Center will benefit from the proposed project. Effects of the project will result in direct benefits through damage reduction, elimination of many street and bridge repairs and replacements, and reduction of health hazards. The project will also increase the level of economic activity in the city and adjacent areas by providing greater purchasing power, improved economic stability, and by providing for the maximum development of the watershed.

Works of improvement will substantially reduce flood flows in areas currently subject to flood damage. The reduction in discharge is shown in the following table.

Peak Discharges in Cubic Feet per Second

| | 100-Year | | 5-Year | |
|---|---|---|---|---|
| Location | Without | With | Without | With |
| Richland Center | 18,600 | 10,900 | 7,000 | 4,550 |
| Near Structure 36 | 7,250 | 550 | 2,800 | 250 |
| Near the Down-stream End of the Watershed | 19,300 | 13,600 | 7,200 | 6,000 |

Approximately 9,480 acres of flood-vulnerable agricultural land will be benefited by the proposed project measures. The following levels of protection will be obtained: near ½-year protection in reaches C, D, F, G, K, L, M, N, O, R, and T; near 1-year protection in reaches A and S; near 2-year protection in reaches I and J; near 10-year protection in reach B; and near 100-year protection in reaches E and H. The above levels of protection are minimums. Many portions of the reaches discussed will have a much higher level of protection. In areas immediately downstream from proposed structures, a near 100-year level of protection will be approached.

About 205 rural landowners will be directly benefited from the installation of the structural measures. Others located within and outside the watershed boundary will receive indirect and secondary benefits.

The program will allow about 295 acres of flood-vulnerable pasture to be converted to cropland, thereby permitting better use of steeper fields for pasture and woodland. Benefits will accrue at 58 bridge locations because of reduced road and bridge repairs, savings in bridge replacement costs, and the elimination of road closures during flood events.

It is estimated that with the works of improvement installed average annual damages, excluding urban damage and sediment damage but including indirect damages, will be reduced from $335,600 to $179,400. This represents an average annual reduction of $156,200, or 46 percent.

Land treatment and structural works of improvement will improve the quality of trout water by reducing floods and the deposition of sediment in the stream channel. An increase in sediment deposition will occur in the sediment ponds immediately above the structures. Trout stream improvement measures installed downstream from structure site 21 on Melancthon Creek should enhance the trout fishery.

Cold water released from the bottom of the two recreation lakes during the summer will reduce water temperatures in the streams below the structures. This water, which may be low in dissolved oxygen, will be effectively aerated by a 40-foot drop in the inlet risers and energy dissipation pools at the outlets. (21) Reduced summer water temperatures will enhance existing trout habitat and may make additional stream reaches habitable for trout where water temperatures are currently the limiting factor.

MPS 2, because of the permanent pool depth and amount of stream base flow and water quality, should develop into an excellent fishing resource. A cold water fishery is possible. MPS 36 will impound a large volume of water and with good management will provide a fine warm water fishery. Wet sediment pools developed at sites 7 and 32 will provide habitat for wildlife and limited potential for fishing. Nonaquatic wildlife habitat will be enhanced through proper land treatment and flood control.

The recreational developments at sites 2 and 36 are planned for maximum use for a 3-month period during the summer from approximately June 1 through September 1. It is estimated that 852 people will use these recreational facilities per weekday during the summer. On weekends, 1,880 people per day are expected to make use of the developments. During the summer season plus the late spring and early fall, it is anticipated that 142,800 visitations will be realized at the recreational developments. Recreational facilities at sites 2 and 36 will provide opportunities for swimming, boating, fishing, picnicking, camping, hiking, and nature study.

Water impounded in the two multiple-purpose sites will have the effect of moderating the influence of upstream water quality on downstream water quality through mixing of stream water with impounded water. The impoundments will impose water quality changes by allowing chemical, biological, and physical processes to proceed beyond the extent possible in a flowing

stream. Predicted changes under future impoundment conditions are at best speculative. Predicted conditions at MPS's 2 and 36 are based on an analysis of existing stream water quality above and below the impoundment sites and comparison of conditions at existing comparable P.L. 566 impoundments.

Water quality parameters having a potentially adverse impact on use of impoundments for water contact sports were specifically analyzed. It was determined that the esthetic and chemical quality of the inflowing water (appendix C) would provide an impoundment typical of other southern Wisconsin lakes that became europhic and nutrient rich. Toxic substances (organochlorine pesticides and PCB's in water and bed material and herbicides in water) were not detectable at either site 2 or 36 during the two years that grab samples were taken. Insufficient N and P data are available to compute a complete nutrient budget, but there is a potential algal bottom problem under impoundment conditions. The count of fecal coliform and fecal streptococci above the MPS sites were high enough to justify continued monitoring and possible corrective action prior to construction of the impoundments. If a problem is found to exist and if upstream waste management practices and impoundment detention time are not adequate, upstream detention basins will be considered. Compared to existing P.L. 566 impoundments of comparable surface area, lake morphology, climate, mean depth, inflow, and incoming water quality, both sites should have water quality suitable for water contact sports as well as fish and wildlife uses. Algal blooms can be anticipated but should be confined to the shallower upstream areas away from the major recreational developments.

During construction there will be an unavoidable increase in air and noise pollution and stream sedimentation. The structure area, borrow areas, and haul roads will be stripped of vegetation for varying periods of time during construction. The use of sediment basins and the immediate revegetation of denuded areas will minimize the resulting erosion and sedimentation.

Mowing at all structure sites and sediment pools will be restricted. Weed and brush control should be confined to spot mowing or spot treatment with acceptable herbicides. This will provide undisturbed grass cover for wildlife habitat areas.

Limited grazing of livestock will be allowed only at dry dam sites.

Approximately 14,000 feet of road will have to be rerouted around structure sites.

The largest modification will occur at site 36 where 21,000 feet of old State Highway 80 will be scheduled for abandonment. Total cost of reclaiming the old roadbed is $50,000.

Other land rights to be acquired include 3,122 acres of land which does not include 270 acres now owned by the district, 14 farmsteads, 15 relocations, and numerous power poles. The total cost of land rights, including road change and road abandonment, will be $2,045,500.

About 7.2 miles of the approximately 200 miles of perennial stream (3.6 percent) in the watershed will be temporarily inundated by the proposed structures in case of a 100-year flood event. The dams and spillways will eliminate 146 acres of cropland but will provide 146 acres of grassland.

The wet pools, including recreation lakes, will inundate 5 acres of forest land, 353 acres of grassland, and 215 acres of cropland. Seventy-one acres of grassland and 75 acres of cropland will be replaced by 146 acres of grassland in the dry sediment pools.

The proposed wet sediment pools at sites 2, 7, 32, and 36 will inundate 13 acres, 10 acres, 45 acres, and 260 acres of wetlands respectively. The following table shows the change in types 2 through 8 wetlands.

| Site | Inundated by Structures and Wet Sediment Pools | Changes Caused by Structures and Wet Sediment Pools |
|---|---|---|
| 2 | 12 acres of type 2 | 10 acres of type 2 |
| | 1 acre of type 7 | 3 acres of type 3 |
| | | 6 acres of type 4 |
| | | 14 acres of type 5 |
| 7 | 5 acres of type 2 | 5 acres of type 2 |
| | 2 acres of type 3 | 5 acres of type 3 |
| | 3 acres of type 6 | 4 acres of type 4 |
| | | 8 acres of type 5 |
| 32 | 25 acres of type 2 | 7 acres of type 2 |
| | 12 acres of type 3 | 20 acres of type 3 |
| | 7 acres of type 6 | 6 acres of type 4 |
| | 1 acre of type 7 | 10 acres of type 5 |
| 36 | 215 acres of type 2 | 42 acres of type 2 |
| | 20 acres of type 3 | 32 acres of type 3 |
| | 25 acres of type 7 | 40 acres of type 4 |
| | | 135 acres of type 5 |
| TOTALS | 257 acres of type 2 | 64 acres of type 2 |
| | 34 acres of type 3 | 60 acres of type 3 |
| | 10 acres of type 6 | 56 acres of type 4 |
| | 27 acres of type 7 | 167 acres of type 5 |
| | 328 acres | 347 acres |

The greatest impact will occur at site 36 where 215 acres of type 2 wetlands (inland fresh meadow) will be inundated. These marshes presently support wildlife populations of muskrat, mink, and sparrow hawks. Populations of these animals may be reduced because of the change in specialized habitat and loss of prey.

The trend will be toward a type 2 wetland in the sediment pools of dry dam sites. The potential is there because of a lower stream gradient and the associated sediment deposition in the channel which blocks horizontal drainage, the decreased vertical permeability caused by horizontal stratification, and an increase in organic matter. Because of the many variables present, it is believed that the types 1 and 2 wetlands cannot be quantified at the dry dam sites.

Because of grazing, the types 1 and 2 wetlands presently in the Pine River watershed are not ideal for wildlife habitat. The type 2 wetlands that will be created in the wet pool sites will be more valuable than what is existing prior to inundation because there will be no grazing at the wet pool sites.

Stream habitat improvement will be done on 4.5 miles of stream below site 21 on Melancthon Creek. The banks will be improved by sloping, seeding, and fencing. Instream devices will provide cover and spawning areas. This will preserve and improve the trout habitat in this reach.

About 436 acres of cropland will be converted to dams, spillways, and sediment pools. An additional 404 acres of cropland located in retarding pools will be subjected to an increased risk of occasional short duration flooding. This loss and increased risk will have a negative economic impact on farming near the structure sites. The structures will have a positive economic impact by enhancing production on 3,120 acres of cropland by reducing flooding.

The 534 acres of lakes created by sites 2 and 36 multiple-purpose floodwater retarding and recreational structures and associated recreational facilities will provide increased recreational opportunities for water-based recreation such as fishing, boating, contact sports, canoeing, sailing, etc. These sites will attract an average of 142,800 visitations annually.

Ash, Basswood, Fancy, Gaunt Hollow, Grinsell Branch, Hansell, Hawkins, Horse, Johnson, Melancthon, and Pier Spring Creeks, the Pine River-Yuba Branch, and the west branch of the Pine River all have stream reaches of class II and III trout water. (See detailed description in "Environmental Setting" section.)

Melancthon, Hansell, and Grinsell Creeks have excellent potential as trout spawning areas. All three have natural reproduction of brook trout while Melancthon also has natural reproduction of brown trout. Melancthon Creek is considered to be one of the finest trout waters in Richland County. Site 21 on Melancthon Creek is planned to be a dry dam, but the structure is located below one of the creek's principal spawning areas. Migration features will be

## IMPACT SUMMARY

| Structure Site No. | Stream Replaced By Pipe Through Dam (Feet) | Channel Modified Below Structure (Feet) | Stream In Sediment Pool (Feet) | Stream In Retarding Pool (Feet) | Area Required For Dam and Spillway (Acres) | Land Use in Sediment Pool Area: Before Installation (Acres) | Land Use in Sediment Pool Area: After Installation (Acres) | Land Use in Retarding Pool Area: Before Installation (Acres) | Land Use in Retarding Pool Area: After Installation 2/ (Acres) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 330 | 250 | 4,800 | 1,100 | 5-Cropland<br>5-Grassland<br>2-Forest Land | 12-Cropland<br>5-Forest Land<br>33-Grassland | 12-Water<br>5-Water<br>33-Water | 5-Cropland<br>12-Grassland | -<br>- |
| 7 | 190 | 150 | 1,600 | 800 | 8-Cropland<br>4-Grassland | 14-Cropland | 14-Water 1/ | 10-Cropland<br>3-Grassland | -<br>- |
| 9 | 210 | 100 | 2,100 | 1,600 | 11-Cropland | 4-Cropland<br>12-Grassland | 4-Grassland<br>No Change | 6-Cropland<br>6-Grassland | -<br>- |
| 11 | 210 | 250 | 3,700 | 3,700 | 22-Cropland | 24-Cropland<br>5-Grassland | 24-Grassland<br>No Change | 20-Grassland<br>39-Cropland | -<br>- |
| 14 | 380 | 150 | 5,300 | 8,400 | 34-Cropland<br>24-Grassland | 21-Grassland<br>30-Cropland | No Change<br>30-Grassland | 200-Cropland<br>52-Grassland | -<br>- |
| 21 | 310 | 150 | 2,640 | 1,600 | 6-Grassland<br>5-Forest Land | 16-Grassland | No Change | 5-Forest Land<br>44-Grassland | -<br>- |
| 32 | 230 | 300 | 3,700 | 3,700 | 20-Grassland<br>19-Cropland | 5-Cropland<br>20-Grassland | 5-Water 1/<br>20-Water 1/ | 30-Cropland<br>63-Grassland | -<br>- |
| 33 | 250 | 200 | 3,700 | 4,200 | 2-Forest Land<br>27-Cropland<br>10-Grassland | 15-Grassland<br>17-Cropland | No Change<br>17-Grassland | 20-Cropland<br>45-Grassland | -<br>- |
| 36 | 420 | 400 | 20,600 | 12,700 | 1-Forest Land<br>14-Grassland<br>20-Cropland | 184-Cropland<br>300-Grassland | 184-Water<br>300-Water | 94-Cropland<br>152-Grassland | -<br>- |

1/ The wet sediment pool will replace 39 acres of cropland and grassland with a 39-acre lake surface. The water will gradually be replaced by sediment during the 100-year design life of the structure.

2/ No significant change in land use is anticipated.

installed to aid the migration of brood fish back upstream to their spawning grounds. Migration features include a V-notch cunette in the conduit which will maintain a minimum water depth of four inches. Maximum fall from the pipe outlet to the stilling basin will be one foot or less. these features will be very effective in allowing normal fish migration.

The installation of fish migration features at the dry pool structures will allow for fish migration. The design of the floodwater retarding structures will include a modified inlet which will permit the structures to be operated with a wet or dry sediment pool for fish and wildlife purposes.

Wet sediment pools at sites 7 and 32 will require public ownership of 39 acres of the pool area as well as a 300-foot-wide public ownership strip around each pool. (A 700-foot-wide conservancy zoning strip around each wet sediment pool is recommended.) Public access will be provided to these sites. As these wet sediment pools fill in with sediment, they will become wetlands. These wetlands will replace the small amounts of wetlands inundated at sites 7 and 32 as well as some of the wetlands inundated at site 36.

Recreation pools at sites 2 and 36 will have access and recreational facilities for public use. In addition to the 534 acres for the pool areas, 1,604 acres of land will be acquired for recreational use.

Dry sediment pools are planned for sites 9, 11, 14, 21, and 33. Much of the area in the dry sediment pools will develop plant cover providing wildlife habitat and permitting controlled livestock grazing. Land use in the retarding pool areas can remain unchanged except that the flood damage risk will be greater.

The red side dace, recently listed as watch status by the Wisconsin Department of Natural Resources, will probably benefit from the reduction in turbidity provided by the flood retarding structures.

No rare or endangered animal species are known to be affected by the project.

Visual inspection of aerial photographs identified MPS 36 as the most likely area where rare or unusual plants could be affected by structural measures. Of particular concern were the sandstone cliffs in the vicinity of the structure. A thorough investigation of this area was conducted by William Tans, Wisconsin Scientific Areas Botanist. (See appendix D for complete report.) The unusual plant, Sullivantia renifolia, was located on cliffs in the vicinity of the site. The plants were found on the cliff above the top of the dam. The height of the permanent pool is 30 feet below the top of the dam. It is highly unlikely that the ground water will rise in the abutments far enough to affect it. During flooding, water will not rise above the dam. Therefore, this endangered species will not be affected by the structure. This plant is considered unusual because it is a characteristic of the Driftless Area.

An extensive upland forest located to the north and west of the proposed dam site was also inspected. The understory is described in the Natural Area Report as "rather rich-without weeds-with little disturbance obvious. . .". Over 100 species were recorded. The use of this area for hiking and nature study as recommended in the watershed plan would be consistent with the preservation of the area's unusual flora.

Remaining lands which would be affected by the proposed lake are either heavily grazed or tilled. No rare or unusual plants would be expected under such management.

Detailed investigations were not conducted at the remaining structure sites. Field reconnaissance and analysis of land use and management indicated little chance of adverse effects on rare or unusual plant communities at these sites.

The floodwater retarding structures operated with dry sediment pools will have a negligible effect on ground water levels and quality because detention time is too short to allow for any significant ground water mounding. Floodwater retarding structures operated with wet sediment pools could develop a minor area of influence immediately adjacent to the pool areas where ground water levels could be raised. Since these pools are quite shallow (less than 15 feet in depth) the effect is expected to be insignificant.

Water permanently impounded in the two recreation structures will eventually influence ground water levels and gradients adjacent to the pools. Since both sites are bounded by massive upland areas, a noticeable effect on ground water in the adjacent valleys is not anticipated. A measurable increase in ground water discharge may occur for some distance downstream from the structures. Ground water quality should remain essentially unchanged.

## Economic and Social

The quality of man's environment will be improved with the reduction of flood damages. The risk of drowning will be increased at recreational sites. The quality of life in the flood-prone areas will improve with increased flood protection. Reduced flooding will result in less water-borne debris to be removed. The flood plain will be more usable for recreational activities because of less flooding and sediment and debris deposition. Traffic interruptions because of flooded streets will be minimized. The threat of death by drowning during floods will be reduced.

Reduced flood risks will enhance economic opportunities for individual farmers.

The project will create, in the watershed, 6 semiskilled and 30 skilled jobs per year during the 8-year construction phase, 6 permanent semiskilled

seasonal jobs, 14 permanent skilled jobs, and 17.5 permanent semiskilled jobs.

Secondary benefits stemming from the project will accrue because of the increased production of goods which will be transported, processed, and marketed by local industries. These benefits amount to approximately $82,200.

The employment of unemployed labor on project construction and operation and maintenance constitutes redevelopment benefits. Redevelopment benefits will be $41,800 annually.

The project will require the relocation of 15 families. These families will have to adapt to new surroundings and social ties. The monetary cost of these relocations is estimated at $96,800.

The proposed recreational sites will cause an influx of people. This may result in more litter as well as air and noise pollution from increased auto use. Increased traffic will increase road maintenance cost and may cause additional safety hazards to pedestrians. The local economy may benefit from increased demand for goods and services.

Private development could occur near the recreation sites leading to further conversion from agricultural land uses with attendant increased market values and possible tax pressure on adjacent non-converted lands. This could impose social, economic, and regulatory pressures that may be disruptive to the present lifestyle of local citizens.

Adverse effects on water quality by private developers will be minimized by State and local regulations which restrict development on flood plains and shorelines, regulate and monitor on-site sewage disposal systems, and enforce building codes.

## Favorable Environmental Effects

Average annual direct floodwater damages will be reduced by 46 percent in agricultural areas. The urban areas of Richland Center, Hub City, and Rockbridge will be protected from Pine River floods up to and including the 100-year flood event, or about $269,900 annually. Road and bridge damage within the city limits is not included in these damages.

Land treatment measures on the uplands will reduce cropland sheet and rill erosion from 4.4 to 3.0 tons per acre per year.

The installed structures will trap sediment, generally reducing downstream turbidity and improving game fish habitat. Sediment deposition in the Richland Center Mill Pond will be reduced by 8,060 cubic yards per year by

structural measures and 5,200 cubic yards per year by land treatment measures. Land treatment and structural measures will reduce sediment delivered to the Wisconsin River from about 49,000 to 33,300 tons per year.

Ground water recharge will be increased through impoundments and land treatment practices.

Flooding will be eliminated or reduced for 496 homes and businesses. The dikes system and other structural measures will provide Richland Center with 100-year flood protection from the Pine River.

Installation of the proposed land treatment measures during the 8-year installation period will provide on-site benefits on approximately 11,160 acres of cropland, 12,980 acres of grassland, and 32,500 acres of forest land. This includes measures installed under both the ongoing and accelerated land treatment programs. The total acreage receiving on-site benefits, 56,640, is about 35 percent of the 159,200 acres in the Pine River watershed.

About 205 rural landowners will be directly benefited by floodwater damage reduction. It is anticipated that landowners who benefit from reduced flooding will convert about 295 acres of flood-vulnerable pasture to cropland. The rural 100-year flood plain will be reduced from 7,920 acres to 6,620 acres.

The recreational sites (2 and 36) will provide opportunities for swimming, boating, fishing, picnicking, camping, hiking, and nature study. Annual visitations will total 142,800.

High quality grass cover will be provided for wildlife habitat at all dam sites. Limited mowing for weed control will be required within the public ownership areas. Much of the dry pool areas will develop plant cover providing wildlife habitat and limited grazing.

The dams and spillways will provide 239 acres of grassland. The dry pool areas will provide 75 acres of additional grassland.

About 573 acres of lakes will be provided. Besides the 534 acres included in the recreational sites, there are 39 acres of wet sediment pools included in the total. The wet sediment pools will have public access and will provide increased recreational opportunities for fishermen. After 100 years they may fill in with sediment and become wetlands, replacing some of the wetlands lost at other structures. The lakes will provide stopovers for migratory waterfowl.

Two lakes, totaling 534 acres, and two wet sediment pools, totaling 39 acres, will provide aquatic habitat for fish and wildlife.

The quality of man's environment will be improved by the project.

The influx of people into the area should benefit the area economically.

Installing the four wet pool sites (2, 7, 32, and 36) will result in approximately 347 acres of wetlands.

It is estimated that the recreation pool at MPS 36 will provide 249 acres of types 2, 3, 4, and 5 wetlands. In addition, 33 acres of types 2, 3, 4, and 5 wetlands will be provided at MPS 2. A net gain in types 3-5 wetlands will occur. These types are generally considered more valuable for wildlife than types 1, 2, 6, or 7.

## Adverse Environmental Effects

During construction there will be a temporary localized increase in air and noise pollution and stream sedimentation. 1/ The structure areas, borrow sites, and haul roads will be stripped of vegetation for varying periods of time during construction.

Approximately 14,000 feet of road will have to be rerouted around the structure sites. Many power poles and other utilities will have to be modified.

About 15 families will have to be relocated.

About 7.2 miles of perennial stream out of a total of approximately 200 miles will be temporarily inundated by the proposed structures in case of a 100-year flood event. The dams and spillways will eliminate 146 acres of cropland. The wet pools, including recreation lakes, will inundate 5 acres of forest land, 353 acres of grassland, and 215 acres of cropland. Seventy-five acres of cropland will be changed to grassland in dry sediment pool areas. About 1,106 additional acres, including 404 acres of cropland, may be flooded when storm water is temporarily stored.

Approximately 328 acres of wetlands will be inundated. The 260 acres inundated at site 36 will reduce habitat for populations of muskrat, mink, and sparrow hawks.

The floodwater retarding and multiple-purpose structures will cause changes in channel and flow characteristics which may have adverse effects on trout waters. Site 21, located below a principal spawning bed on Melancthon Creek, may effect trout reproduction. Spawning areas in the sediment pool will be periodically covered with sediment during major flood events. This could reduce or eliminate reproduction which currently takes place within one-half mile upstream from the dam site.

Visitors to the recreational sites may cause air and noise pollution and litter, as well as traffic problems, and additional road maintenance. An increased risk of drowning will exist at the recreational sites.

1/ Federal Safety, Health, and Conservation requirements will be observed and enforced.

The esthetics of vegetated earth dams and dikes and outlet system may not be appealing to some. Depending on the location of the observer, some esthetically appealing scenic views of valley, upland, and the Mill Pond will be blocked.

## ALTERNATIVES

Various combinations of structural and nonstructural measures were considered, including those suggested by interested agencies, groups, and individuals. The more significant alternatives are as follows:

1. Continuation of present trends.

2. Accelerated land treatment.

3. Accelerated land treatment, flood plain zoning, floodproofing of existing buildings subject to flood damage, and flood plain evacuation.

4. Accelerated land treatment, flood plain zoning, and 2.5 miles of dikes and an outlet system.

5. Accelerated land treatment, flood plain zoning, 2 multiple-purpose floodwater retarding structures (2 and 36), and 2.5 miles of dikes and an outlet system.

6. Accelerated land treatment, flood plain zoning, 6 single-purpose floodwater retarding structures (7, 9, 11, 14, 21, and 33), 2 multiple-purpose floodwater retarding structures (2 and 36), and 2.5 miles of dikes and an outlet system.

7. Accelerated land treatment, flood plain zoning, 7 single-purpose floodwater retarding structures (7, 9, 11, 14, 21, 32, and 33), 1 multiple-purpose floodwater retarding structure (2), and 2.5 miles of dikes and an outlet system.

8. Accelerated land treatment, flood plain zoning, and a large dam north of Richland Center.

Alternative 1

Continuation of present trends in the watershed will result in the installation of the ongoing land treatment program. This program will provide about 26,680 acres of adequately treated land at a cost of approximately $1,245,000 in the next 8 years. Net average annual benefits foregone are $125,200.

Damage caused by flooding will continue to occur. Small amounts of pollution control, erosion control, and wildlife habitat will be provided, but significant improvements will not occur. Damage to the agricultural base for sustained production will continue. With the ongoing rate of applying land treatment continuing, the average watershed erosion rate will be reduced from 4.4 to 4.0 tons per acre per year. More intensive land use, such as the increased use of the flood plain, can be expected. This will increase the damages that occur on such land. The need for public water-based recreational develop-

ments and environmental education facilities in an outdoor classroom setting are unlikely to be fulfilled. The threat of loss of life by drowning and frequent disruption of transportation facilities by flooding will continue.

Alternative 2

The accelerated land treatment alternative includes the installation of both the ongoing and accelerated land treatment programs. Approximately 56,640 acres will be adequately treated. Cost of installing the ongoing and accelerated land treatment programs over the 8-year project period is an estimated $5,249,400.

Land treatment measures on upland watershed areas will reduce sheet and gully erosion, thereby reducing the sediment load delivered to the stream. Water retention capability of upland areas will be increased, resulting in an overall reduction in surface runoff volume. Land treatment practices in the flood plain will reduce channel erosion and scour. This will result in stabilizing the existing channel and improving the wildlife habitat.

All types of erosion will be reduced allowing valuable agricultural land to remain in production. It is estimated that in the 8-year installation period, the land treatment measures to be installed will reduce sheet and rill erosion from 4.4 to 3.0 tons per acre per year.

The ground water table and ground water recharge will be increased by the land treatment. Runoff will be reduced, allowing time for the water to infiltrate through the permeable soils to the ground water table. This may raise the water table but should not have any adverse effects on the watershed.

Productive land, a prime national resource, can be used more wisely and within its capability. Agricultural production of crops, required to support the basic economy of the watershed community, will be maintained.

Proposed forest land treatment measures will improve the hydrologic condition of the forest land. This will have the effect of reducing surface storm runoff with a subsequent decrease in sediment yield. Also, proper management, protection from grazing, and continued fire protection will increase the productivity of the forest land in the watershed.

Installation of the proposed land treatment measures during the project period will provide on-site benefits on approximately 24,000 acres of cropland and grassland and on 21,000 acres of forest land. The total acreage receiving on-site benefits, 45,000 is about 28 percent of the 159,200 acres in the watershed.

Alternative 3

The third alternative includes the ongoing and accelerated land treatment, flood plain zoning, floodproofing of existing buildings subject to flood damage, and flood plain evacuation. Existing flood plain ordinances should be adhered to in the watershed. Flood plain zoning will reduce future damages by restricting development in areas subject to flooding. Only uses subject to minimal

flood damages such as agricultural use, day use recreational areas, and environmental corridors should be allowed in future development plans. This is especially effective in minimizing future urban damages. Although very effective in urbanizing areas, flood plain zoning is generally less effective in rural areas because of the type of land use involved. Except at great expense for relocation, roads and bridges in the flood plain will continue to sustain damage. Without prohibitive land use restrictions, agricultural use and associated damages will continue as a calculated risk. There are over 30 variances to the existing flood plain ordinance in Richland Center. A combination of floodproofing and flood plain evacuation will be needed to protect these and other existing buildings. Of the 496 homes and businesses damaged by flooding, 52 should be floodproofed, at an estimated cost of $400,000. Floodproofing would consist of reinforcing basement walls, installing sump pumps, and moving equipment or products to a higher elevation. About 172 homes and businesses should be relocated at a cost of $9,440,000.

The other 272 homes and businesses should be evacuated when it is anticipated that the water depth may reach the first floor elevation. The pressure from this amount of water could cause the walls to collapse and would be hazardous to life. The U.S. Department of Commerce, National Weather Service, could assist the local people in planning an evacuation schedule for 100-year and 25-year events. The estimated cost of this service is $8,300 per year, which includes costs for security and per diem allowances.

## Alternative 4

Alternative 4 consists of ongoing and accelerated land treatment, flood plain zoning, and 2.5 miles of dikes and an outlet system. The dikes and outlet system are similar to those in the selected plan except that the dikes are 1 to 2 feet higher. Richland Center would be protected from the 100-year flood from the Pine River by the dike. This would reduce floodwater damages in Richland Center by 100 percent, or about $306,500 annually. Because there would be no structural control of the area above Richland Center, floodwater damage reduction in the upland agricultural land would be minor. Cost of installing the structural portion of this alternative is an estimated $1,108,300.

Some temporary and permanent road changes associated with the dike system construction may inconvenience local traffic in Richland Center. The permanent changes will improve traffic flow.

The economic well-being of the community of Richland Center is tied to the agriculture of the watershed. The watershed sponsors have requested flooding reduction measures in agricultural as well as urban areas for the benefit of the watershed.

The esthetic appearance of the dikes might be displeasing to some. The dikes will be revegetated after construction.

Sediment deposition in the Mill Pond at the rate of 30,650 cubic yards per year will continue to shorten its useful life as a source of cooling water for the power generation station. The Mill Pond's usefulness as a recreation area will continue to degrade.

Alternative 5

This alternative consists of ongoing and accelerated land treatment, flood plain zoning, 2 multiple-purpose structures (2 and 36), and 2.5 miles of dikes and an outlet system. Floodwater damages would be reduced by 54 percent, or about $351,000 annually. Cost of installing the structural portion of this alternative is an estimated $6,217,200.

Richland Center would be protected from the 100-year storm by the dikes and outlet system. The multiple-purpose structures would provide 534 acres of lakes and 142,800 annual visitations for water and land-based recreation. Opportunities for swimming, boating, fishing, picnicking, camping, hiking, and nature study will exist. About 25 acres of cropland, 19 acres of grassland, and 3 acres of forest land will be required for the dams and spillways. About 196 acres of cropland, 333 acres of grassland, and 5 acres of forest land will be converted to 534 acres of water. These two structures will control 44.8 square miles, or 54 percent, of the drainage area controlled by the structural measures of the selected plan.

Alternative 6

Alternative 6 includes the ongoing and accelerated land treatment program, 6 floodwater retarding structures (7, 9, 11, 14, 21, and 33), 2 multiple-purpose sites, and 2.5 miles of dikes and outlet system in Richland Center. This is the same as the selected plan without FRS 32. This combination of structures will reduce the damage level from that of a 100-year flood to approximately that of a 18-year flood. Richland Center will be protected from a 100-year flood by the structural measures. The elimination of structure 32 will increase the flooding damage on Horse Creek, but with the dikes and outlet system, will not affect the flooding at Richland Center. The estimated cost of installing the structural portion of this alternative is $10,667,100.

Alternative 7

Alternative 7 includes ongoing and accelerated land treatment, flood plain zoning, all 7 single-purpose structures (7, 9, 11, 14, 21, 32, and 33), 1 multiple-purpose structure (site 2), and 2.5 miles of dikes and outlet system. This combination of structures will reduce the damage level from that of a 100-year flood to approximately that of a 45-year flood. Richland Center will be protected from a 100-year flood by the structural measures. Cost of installing the structural portion of this alternative is an estimated $7,345,900.

Alternative 8

Alternative 8 includes accelerated land treatment, flood plain zoning, and a large dam just north of Richland Center. Such a dam would provide Richland Center with flood protection but would not protect the agricultural land of the watershed. Because of its size, this structure would be ineligible for P.L. 566 assistance.

# SHORT-TERM VS. LONG-TERM USE OF RESOURCES

Pine River watershed is within the Wisconsin River subregion of the Upper Mississippi River Region as delineated by the Water Resources Council. The type I framework study for the Upper Mississippi River basin region designated the Wisconsin River subregion as a priority study area. A USDA type 4 cooperative river basin study is currently being conducted for the subregion. The Wisconsin River subregion includes portions of four state regional planning commissions which are in various stages of preparing regional plans. The Pine River watershed is located primarily in Richland County which is within the Southwestern Wisconsin Regional Planning Commission.

Land use within the Pine River watershed is primarily agricultural and is not expected to change materially in the future. There is a trend toward increased private recreational use of woodlands.

The project is designed to solve long-term as well as short-term land and water resource problems. Essentially the project will reduce options for long-term land use on areas incorporated into the dikes; dams; spillways; and sediment, conservation, and flood retarding pools involving 1.1 percent of the watershed area. Much of the land with reduced options could be utilized for purposes compatible with operation of the structures such as wildlife habitat management and selected agricultural uses. Options available for long-term uses on the remaining 98.9 percent will be maintained or increased.

The project is compatible with the long-term land use trends, primarily agricultural, and will help maintain stability of the economic system. Land treatment measures will provide for preservation of the soil and water resources over the long term and allow reasonable use through time.

The completed project is expected to be effective in conserving land and water resources long after its designed life. The degree of flood prevention will remain high. Sediment control will continue after the designed life of the structures, especially if hydrologic conditions are improved beyond those proposed in this project or if sediment is removed from the storage areas provided at each site.

Within the Wisconsin River subregion, the status of the P.L. 566 watershed program is as follows: construction completed - 3; authorized for construction -6; authorized for planning -1; and applications received and awaiting further action -3. In addition, there are at least six potentially feasible projects.

Watershed protection and flood prevention measures will compliment existing measures installed in other water resource projects in the subregion, thereby increasing the overall effectiveness of each individual project in reducing sediment deposition and flooding within the subregion as a whole. The two

multiple-purpose sites will provide recreational facilities to accommodate 142,800 visitor-use days. This capacity will relieve overuse of existing recreational facilities in the area. Most water-based recreational facilities within 50 miles of the two proposed multiple-purpose structures are small public and private developments. The only potential project that could have significant impact is the LaFarge project by the Army Corps of Engineers on the Kickapoo River. This project, if completed as originally proposed, would consist of a multiple-purpose flood control and recreational structure located about 25 miles west of the Pine River watershed. Because of strong environmental and economic concern, the future of the proposed 1,780-acre recreation lake is uncertain. Regardless of the future of the lake, approximately 9,000 acres of land already purchased for the project will be devoted to some type of public recreational use. Estimated use of recreational facilities provided by the Pine River watershed project is based on a consideration of possible impacts of the LaFarge project. If the LaFarge Lake development is not completed, the Pine River estimates will be quite conservative.

The Pine River watershed, along with 11 other completed, planned, and applied-for P.L. 566 water resource projects, are concentrated in the lower one-third of the Wisconsin River subregion. All 12 projects have the same basic watershed protection and flood prevention objectives. Cumulatively they will have a significant impact on water quality of the subregion by reducing sediment as well as other non-point source chemical and organic pollutants. Land quality of the subregion will be significantly improved on a cumulative basis. The combined effect of these projects is not to change the environment but to enhance it for present and future use. Flood reduction will have a significant economic as well as a more subtle environmental impact on the region. The several water-based recreation developments will improve quality of life for residents in the lower one-third of the subregion.

## IRREVERSIBLE AND IRRETRIEVABLE COMMITTMENTS OF RESOURCES

Approximately 239 acres of cropland, grassland, and forest land will be committed to dams and spillways with the installation of the project. Vegetative cover will change to grassland. Use will be limited to wildlife habitat and recreation and controlled grazing in dry pools.

About 19 acres of cropland and 20 acres of grassland will be committed to wet sediment pools. About 75 acres of cropland and 71 acres of grassland will be committed to the dry sediment pools. Approximately 295 acres of cropland, 495 acres of grassland, and 5 acres of forest land will be committed to reservoirs and flood pools at the 2 recreational sites. Use will change to 99 acres of grassland from cropland; 164 acres will remain in grassland; and 573 acres will change to open water (this includes 39 acres in the wet sediment pools).

Approximately 468 man-years of labor will be expended in the construction of the project. Approximately 6 man-months of labor will be expended annually for inspection, operation, and maintenance of the structures.

An estimated $16,935,500 of capital is required to install project measures including land treatment and structural measures. Most materials expended to build the works of improvement will be from local sources.

No other permanent commitment of resources is known to be required.

## CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

### General

The original application for project assistance which included only the upper reaches of the Pine River watershed was received in December 1961. A revised application for project assistance including the entire Pine River watershed (except Willow Creek) was received in August 1965. The applications, sponsored by the Richland and Vernon County Soil and Water Conservation Districts, were submitted to and approved by the State of Wisconsin Board of Soil and Water Conservation Districts (formerly the State Soil and Water Conservation Committee) representing the Governor of Wisconsin. Planning priority was established in December 1965 by the State of Wisconsin Board of Soil and Water Conservation Districts. A preliminary investigation report was prepared in March 1967. Planning authority for development of a Watershed Work Plan was issued by the Administrator of the Soil Conservation Service in April 1967. At that time the following agencies were notified of planning intentions and requested to furnish any comments or suggestions they might have concerning the project: U.S. Army Corps of Engineers, St. Paul, Minnesota; U.S. Department of Health, Education, and Welfare, Chicago, Illinois; U.S. Bureau of Mines, Pittsburgh, Pennsylvania; U.S. Fish and Wildlife Service, Twin Cities, Minnesota; Federal Water Pollution Control Administration, Chicago, Illinois; Wisconsin Department of Natural Resources; Wisconsin Department of Transportation; Wisconsin Board of Soil and Water Conservation Districts; University of Wisconsin-Extension; U.S. Forest Service; USDA, Agricultural Stabilization and Conservation Service; and USDA Farmers Home Administration. Subsequently, the U.S. Environmental Protection Agency, the Wisconsin Departments of Administration and Health and Social Services, and the Southwestern Wisconsin Regional Planning Commission were asked for input and suggestions.

The plan was coordinated with the Wisconsin State Historic Preservation Officer. Inputs to the planning process were provided on an ongoing basis . Under his direction, an archeological survey was conducted on July 7 through July 19, 1975, in accordance with a cooperative agreement between the Soil Conservation Service and the State Historical Society of Wisconsin. The land within the proposed flood pools and permanent pools of multiple-purpose sites 2 and 36 was examined. A preliminary archeological reconnaissance of the remaining sites did not disclose any obvious areas of cultural significance. The State Historical Society of Wisconsin has been contracted to do additional archeological investigations on remaining sites during 1976.

The State Historic Preservation Officer has determined that there are no buildings or other structures eligible for inclusion on the National Register of Historic Places which would be effected by the proposed project.

The plan was developed in consultation with Federal, State, and local agencies and groups. Nineteen organizational and informational meetings were held with the sponsors, watershed residents, and other interested agencies up to the time that the preliminary investigation report was presented. Throughout the planning process an additional 27 meetings were held. The primary purposes of

these meetings were to exchange information and keep up to date on local developments. A special attempt was made to keep landowners, watershed residents, special interest groups, the general public, and cooperating agencies fully informed about the planning process. As planning progressed, newspaper articles, spot radio announcements, and meetings kept the public informed. Four special public information meetings were conducted to discuss the selected plan and alternatives. The locations and meeting dates are as follows: Yuba, January 22; Gillingham, January 22; Bloom City, January 23; and Richland Center, January 23, 1974. Comments received at these meetings and at subsequent meetings with the sponsors and public were incorporated in the plan and environmental impact statement. On September 10, 1975, environmental groups; Federal, State, and local agencies; project sponsors; and the general public were invited to participate in a bus tour of the watershed to look at proposed structure sites, ask questions, and make comments prior to preparation of the draft environmental impact statement.

On April 29, 1976, representatives from the U.S. Fish and Wildlife Service, the Wisconsin Department of Natural Resources, the University of Wisconsin Extension, and the Soil Conservation Service met and toured the Pine River watershed. The purpose of the meeting was to discuss environmental concerns and make on-site observations. On April 30, 1976, a representative of the U.S. Fish and Wildlife Service met with Soil Conservation Service personnel at the State Office. Environmental issues and concerns were discussed and resolved to the mutual satisfaction of the two agencies.

For the last three years the Soil Conservation Service has been cooperating closely with the University of Wisconsin, Department of Wildlife Ecology. Dr. Robert L. Ruff has used the Pine River Plan and Environmental Impact study as a practical study exercise for his graduate student class in Wildlife Ecology 550. Over the years, members of the Soil Conservation Service River Basin-Watershed Planning staff at Madison, Wisconsin have been meeting with Dr. Ruff and members of his class, both as a group and individually, to explain Soil Conservation Service programs and methodology in general and components of the Pine River Watershed Plan specifically. As a class exercise, Wildlife Ecology 550 made an in-depth review and critique of the Draft Plan and Environmental Impact Statement for the Pine River watershed. Members of the River Basin-Watershed Planning staff met with Dr. Ruff's class on May 14, 1976, to discuss and resolve specific issues and concerns. The class agreed that discussions and verbal responses provided at the meeting were generally adequate. As a result of the meeting the class agreed to review, revise, and consolidate their comments. They expressed a desire to have their class comments included in appendix B (letters of comments received on the draft environmental impact statement), but felt that the written responses in this section could be brief since their major concerns had been discussed on May 14, 1976, and also because the comments had been submitted after the official due date, making it more difficult to make detailed written responses and suggested changes in the document.

## Discussion and Disposition of Each Comment on Draft Statement

Comments were requested from the following agencies:

U.S. Department of the Army
U.S. Department of Commerce
U.S. Department of Health, Education, and Welfare
U.S. Department of Transportation
U.S. Environmental Protection Agency
Federal Power Commission
Office of Equal Opportunity, U.S. Department of Agriculture
Wisconsin Board of Soil and Water Conservation Districts
Wisconsin Department of Administration
Wisconsin Department of Natural Resources
Mississippi Regional Planning Commission
Southwestern Wisconsin Regional Planning Commission
Advisory Council on Historic Preservation

Responses were received from the U.S. Department of Commerce; the U.S. Department of Health, Education, and Welfare; the U.S. Department of the Interior; the U.S. Department of Transportation; the U.S. Environmental Protection Agency; the Wisconsin Board of Soil and Water Conservation Districts (designated State agency); the Wisconsin Department of Natural Resources; and the Advisory Council on Historic Preservation.

In addition to the responses received from other agencies, comments were also submitted by students enrolled in the course "Wildlife Ecology 550", at the University of Wisconsin, Madison; Robert L. Ruff, Professor. The comments, which were received after the official due date, were discussed with the class on May 14, 1976. Because of prior clarification and discussion of the comments, the numbers of comments, and their late submission, the written responses in this section have been somewhat abbreviated.

## Summary of Comments and Responses

Each issue, problem, or objection is summarized and a response given on the following pages. Page and paragraph references made in the responses are keyed to this document. Corresponding statements may appear on different pages and have different paragraph numbers in the Draft Plan and Environmental Impact Statement. Comments are serially numbered to correspond with the original letters. The letters of comment appear in appendix B.

U.S. Department of Commerce

(1) Comment: Improvements in Pine River include nine floodwater retarding structures. These structures will control the peak flows and reduce sediment supply to downstream reaches. For these reasons, the proposed improvements will have beneficial effects on discharges and water quality of the Wisconsin River.

Response: Comment noted.

U.S. Department of Health, Education, and Welfare

(1) Comment: We have reviewed the Draft Environmental Impact Statement for the above project. To our knowledge, and based upon the information provided, this project will not impact to any significant degree on the health, education, or welfare of the population.

Response: Comment noted.

U.S. Department of the Interior

General Comment: This proposal involves the construction of a dike through Krouskop Park. The proposed dike would traverse Krouskop Park between the river and the swimming pool. Engineering data are not available to determine whether the Allison Park dike around the inholding in the Krouskop Park addition would adversely impact on park land.

The final watershed plan and environmental impact statement should discuss the proposed dike in Krouskop Park. This discussion should include the dimensions of the dike, the existing uses of the park land on which the dike is to be constructed, the impacts of this dike on the park, plans for future use of the park, and the effect of the dike on those plans, need for landscaping and fencing, and possible use of the dike for a trail.

The final document should also show evidence of consultation with the Wisconsin Department of Natural Resources concerning the effect of the proposed dike project on Krouskop Park and the bearing of Section 6(f) of the Land and Water Conservation Fund Act on the project.

Response: Page 17, paragraph 2 of the environmental impact statement has been revised to provide more information about the dike. The Wisconsin Department of Natural Resources (WDNR) was consulted and provided assurance that the proposed dike can be located in Krouskop Park without detriment to existing facilities, potential park land use, or aesthetics. The WDNR will assist in determing the form, precise location, and possible recreation uses of the dike during final design.

Watershed Plan Comments:

(1) Comment: A major concern of our Fish and Wildlife Service (as expressed in their 1967 report and 1970 letter) was the anticipated destruction of trout habitat resulting from the development of site 36 as a multiple-purpose reservoir. Inasmuch that this concern has not been resolved satisfactorily, we suggest that you do not finalize the work plan until it documents that all trout stream losses would be compensated to the satisfaction of the Wisconsin Department of Natural Resources and the Fish and Wildlife Service.

Response: This concern was discussed during a meeting with the Wisconsin Department of Natural Resources and the U.S. Fish and Wildlife Service on April 29 and 30, 1976. It was agreed that the trout habitat that would be destroyed was marginal (class III) and that the acquisition of fishing easements along another trout stream of equal or greater quality would be satisfactory compensation. The plan provides for 4½ miles of easements along Melancthon Creek which exceeds the 3,080 feet (on each side) that will be lost above site 36.

(2) Comment: To ensure that fish and wildlife resources are protected, we recommend that a separate agreement be entered into between the sponsoring local organization, Soil Conservation Service, Wisconsin Department of Natural Resources, and our Fish and Wildlife Service which outlines in detail the design features and operation and maintenance program for all structures. Provision for this agreement should be made a part of the watershed plan agreement before the work plan is finalized.

Response: Concur. This item has been added on page 22.

(3) Comment: Paragraph 1, page 36, inaccurately portrays the condition of trout water in the watershed. High ground water recharge of recent years is only one factor that has improved stream conditions for trout habitation. The trend toward

purchase of small farms by absentee landowners for recreational purposes has resulted in fewer acres under cultivation and contributed to improved water quality. This trend shows no indication of reversal. Also, gravel spawning beds are commonly located in riffle areas which experience a scouring and purging of sediment and organic debris during flooding. Deposition may occur in pools, but the evidence does not indicate poor trout survival. On the contrary, stream surveys indicate that trout survival and natural reproduction in these waters is excellent for southwestern Wisconsin.

Response: Concur. Paragraph 1, page 36 has been revised and a new paragraph added as agreed during a meeting with the Fish and Wildlife Service on April 30, 1976.

(4) Comment: Since stream environment will be altered at all impoundment sites as a result of sediment deposition, the miles of stream that would be lost at the four impoundment sites should be presented for accurate analysis (Selected Plan, Environmental Quality Account). Deposition of sediment in the streams above floodwater retarding structures (FRS) ultimately means an irreversible or irretrievable commitment of trout stream habitat.

Response: The selected plan, environmental quality account has been revised to reflect the alteration of 16.3 miles of trout habitat. This data is also available on page 60 of the environmental impact statement. The Fish and Wildlife Service agreed that this alteration of habitat is not necessarily irreversible or irretrievable.

(5) Comment: The information presented on the recreation benefits to accrue to implementation of the plan is not adequate. It appears that the $321,400 benefit is applicable only to recreation uses at structures 2 and 36, and this was derived by assuming 142,800 visits at a unit day value of $2.25. There is no indication of the magnitude of fishing and hunting which would result from planned fish and wildlife improvement measures. There also is no indication of the amount of recreation that would be provided in the watershed under without-the-plan conditions. Consequently, the net benefit of recreation use cannot be ascertained. The rationale for the assumed visits, the initial and ultimate use expected over the period of project analysis, and a justification for assigning the unit day value should be presented.

Response: On pages 11 and 18 of part II, it is noted that all wet pools will have public access, that fish migration features are planned at sites 9, 11, 14, 21, and 33, and that streambank protection will improve fish and wildlife habitat. The basis for estimating recreation use of sites 2 and 36 is described on page 15, part I. Incidental benefits have not been quantified due to the lack of an objective basis for such an analysis. It is our judgement, however, that incidental benefits will exceed any incidental loses and that net benefits would not materially affect conclusions of the plan.

EIS Comments:

(1) Comment: Page 17, Trout Stream Habitat Improvement. No date for the installation of instream devices was given. Such trout habitat improvement features should be installed prior to construction of site 21.

Response: In order to prevent possible destruction of trout stream habitat improvement features by a major flood, the Fish and Wildlife Service agrees that these features should be installed immediately after the installation of site 21. The "Trout Stream Habitat Improvement" section, page 17, has been reworded accordingly.

(2) Comment: Page 18. It is unclear what agency or organization is to acquire replacement stream easements and railroad and trail easements. It is also unclear whether the replacement easements involve areas of equal recreational value.

Response: Concur. Page 18 has been revised and corrected.

(3) Comment: Page 30, paragraph 3. We suggest that you present the benthic invertebrate collection data as an appendix so that the reader can draw his own conclusions concerning stream conditions.

Response: Concur. Tables 6 and 7 have been added in appendix C to show this data.

(4) Comment: Page 33, paragraph 8. The redside dace (Clinostomus elongatus), collected by Becker in 1963 in the Pine River is now listed by Wisconsin as having watch status (Endangered Animals in Wisconsin, DNR, 1975).

Response: Concur. Page 34, paragraph 4 has been revised to reflect this recent action. Also a statement has been added on page 61.

(5) Comment: Krouskop Park should be discussed including its physical description, type of facilities, and the amount of use, page 35.

Response: Concur. This information has been added on page 35, paragraph 8.

(6) Comment: It is stated that recreational use of the stream is hindered for various reasons. The amount and kind of use that does occur should be described. Reference to the fishing and trail easements held by the DNR would be appropriate in this section. Reference to the study of the Wisconsin River has a potential addition to the National Wild and Scenic Rivers System would also be appropriate.

Response: An addition has been made to page 35, paragraph 7 in regard to this comment. The fact that the WDNR has 2.6 miles of fishing easements with appropriate public access in the Pine River watershed has been included on page 36, paragraph 2. Reference to the National Wild and Scenic Rivers study has been added on page 39 under "Projects of Other Agencies".

(7) Comment: Areas which the Scientific Preservation Council believes have high priority for preservation are listed on page 38. It should be indicated whether any of these areas are affected by the watershed plan.

Response: Concur. A statement has been added on page 38 indicating that none of these areas would be affected by the proposed plan.

(8) Comment: The most recent listing of the National Register of Historic Places shows that the A.D. German Warehouse in Richland Center, identified in this section of the EIS, was added to

the National Register on December 31, 1974. The statement should be revised to indicate this fact and should note whether or not the proposed action would have an effect on this cultural resource. We also recommend that the State Historic Preservation Officer be consulted to determine whether the proposal would affect any other historic sites within the watershed that may be in the process of nomination to the National Register.

Response: Concur. Appropriate statements have been added on page 37.

(9) Comment: The Hub City Bog, indentified in the first paragraph on page 36, has been evaluated by the National Park Service for listing on the National Registry of Natural Landmarks, but has not been found to be nationally significant.

Response: Concur. This statement has been added on page 36, paragraph 5.

(10) Comment: Page 54, paragraph 1. Deposition of sediment in the stream channel occurs in pools in lower reaches of the watershed where floodwater velocity is reduced. Deposition also might be expected above floodwater retarding structures within the limits of the sediment pool.

Response: Concur. This has been added on page 56, paragraph 3.

(11) Comment: Stream riffles are scoured and purged of silt and organic debris during flooding. Structural works may reduce sediment deposition in pools of the lower reaches of the watershed, but an increase in deposition could result above structures and possibly in riffle areas below structures which are no longer subjected to periodic high velocity waters. Also, the instream devices to be installed below site 21 on Melancthon Creek would enhance the trout fishery only if cover is presently a limiting factor.

Response: Water which has been deprived of a majority of its sediment loading in the sediment pool areas above the dam has a greater capacity to scour riffle areas and keep them sediment free without the detrimental side effects of periodic flooding. We concur in the rest of the comment and feel that these points are now adequately handled in the EIS.

(12) Comment: Page 54, paragraph 2. The possibility of hydrogen sulfide and ammonia in the bottom release water and associated adverse effects on the downstream fishery should be discussed. Aeration capabilities should be included in the design of structures 2 and 36.

Response: Concur. A statement has been added on page 56, paragraph 4, which explains the built in aeration features. Oxygenation will minimize or eliminate adverse effects associated with hydrogen sulfide and ammonia.

(13) Comment: Page 54, paragraph 3. The quality of the fishery at multiple-purpose structure 36 would vary directly with the management effort. Costly management techniques such as stocking of large predators, water drawdown for rough fish control, and control of aquatic vegetation are just a few of the measures which might be required to maintain a high quality warmwater fishery.

Response: Concur. Page 56, paragraph 5 has been modified to reflect management imput.

(14) Comment: Wet sediment pools at sites 7 and 32 may have limited potential for a put and take seasonal fishery for the first few years, but thereafter, as water depths increase, fishery values would be lost. The statement should discuss declining fishery values which will take place at multiple-purpose structure 36 and sites 7 and 32.

Response: The statement has been modified on page 56, paragraph 5 to reflect "limited potential" for a fishery in the wet sediment pools at sites 7 and 32. Site 36 can be maintained as a permanent, quality, warmwater fishery. (See comment number 13.)

(15) Comment: According to the table on page 58, the plan would affect more than nine miles of free flowing streams in sediment pools and seven miles of free flowing streams in retarding pools. This should be discussed. The loss of any stream related recreation which would occur should also be discussed. Any loss in recreation associated with the free flowing stream should be subtracted from the recreational benefits claimed for the reservoirs.

Response: In paragraph 1, page 58 of part II, it is noted that 7.2 miles (3.6 percent) of perennial stream in the watershed will be inundated by a 100-year flood event. No data is currently available on uses of these specific stream reaches. With the exception of the main stem of the Pine River, however, river uses would be limited to fishing. The Pine River could accomodate canoeing during certain periods of the year, although it is not popular for this activity. With the exception of site 36, moreover, public access is generally lacking. Levels of use involved are judged to be insignificant in a cost-benefit sense. (Also see watershed plan comment number 5.)

(16) Comment: The impacts of the proposal of the Wisconsin River should be discussed.

Response: On page 64, paragraph 1 of part II it is noted that sediment delivered to the Wisconsin River will be reduced from 49,000 to 33,300 tons per year. Flood peaks entering the Wisconsin River will also be reduced.

(17) Comment: The environmental statement should include an evaluation of effects of the impoundments on ground water levels and quality.

Response: Concur. Such a discussion has been added to the impacts section, page 62.

(18) Comment: Page 62, paragraph 1. As the wet sediment pools fill in, recreational opportunities for fishermen will decrease to zero at some time during the 100-year project life. This concept should be recognized in the statement.

Response: Concur. Wet sediment pools proposed at site 7 and 32 will gradually fill up with sediment over the 100-year evaluation period (page 13). As a result, they have gradual declining value as fisheries, and consequently recreation benefits are considered incidental to the project and no economic benefits have been claimed. This concept has been mentioned throughout the plan and EIS.

(19) Comment: Page 63, paragraph 1. Structure 32 should be added to the list of those which may adversely affect trout waters. Adverse effects also should include a description of the loss of

trout-stream-based recreation. Approximately 2,300 feet of trout stream will be replaced by pipe through the structures. Losses of trout stream habitat would increase throughout the project life as sediment deposition occurs above the structures.

Response: Page 65 has been revised in accordance with a discussion between the Soil Conservation Service and U.S. Fish and Wildlife Service on April 30, 1976.

(20) Comment: Page 73. The loss of stream habitat above floodwater retarding structures will increase throughout the life of the project. All streams, except that on which FRS 9 will be constructed, are trout streams, and the loss of the valuable trout stream habitat is significant. This loss should be recognized as an irreversible and irretrievable commitment.

Response: This concern was discussed during a meeting with the U.S. Fish and Wildlife Service on April 30, 1976. It was agreed that alteration of trout habitat would occur over time, but is not necessarily irreversible or irretrievable. Page 60 summarizes areas influenced by the proposed structures. Habitat in these areas are subject to change, but it is unlikely that it will be completely destroyed except where the natural stream is replaced by conduits.

(21) Comment: The statement is made that the sponsoring local organization is responsible for obtaining all necessary permits (page 19, EIS). Several of the structures may require a Federal permit under Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Inquiries should be directed to the District Engineer, St. Paul, Minnesota 55101.

Response: Comment noted.

U.S. Department of Transportation

(1) Comment: The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

Response: Comment noted.

U.S. Environmental Protection Agency

(1) Comment: According to the draft plan on pages 2, paragraph 6, "The Wisconsin Department of Natural Resources will furnish funds for trout stream habitat improvement and may provide funds for recreational developments". If funds are not provided by the Wisconsin Department of Natural Resources, the effect on the scope of development should be addressed.

Response: The watershed plan agreement is between the Soil Conservation Service and the Richland and Vernon County Soil and Water Conservation Districts (SWCD's). The scope of the project is agreed to regardless of the source of supplemental funding considerations. The Department of Natural Resources in the past has provided some of these funds, but other sources are also available.

(2) Comment: The EIS should explain in more detail how agricultural waste management systems will be planned to contain and manage liquid and solid wastes, including runoff from concentrated waste areas. Also, the effects of these measures on soil, air, and water should be discussed.

Response: Concur. Agricultural waste management systems have been discussed more thoroughly on pages 9 and 10.

(3) Comment: The EIS should acknowledge the new sewage treatment plant serving Richland Center. This plant is protected to 735 feet (mean sea level) which is 2 feet above the level of the 100-year flood. A discussion of the effects, if any, of the proposed dike works at Richland Center on the operation of this plant should be described.

Response: Concur. The EIS, page 38, has been revised in response to this comment.

(4) Comment: The recreational use projections for this project are predicated on the completion of LaFarge Reservoir, for which funding is presently suspended for environmental reasons. The EIS should discuss impacts on the Pine River watershed project if the LaFarge Reservoir is not completed as originally designed.

Response: Concur. A paragraph has been added on page 38 of the EIS to address this issue.

(5) Comment: The listing of the point sources of pollution should include the Richland Center Foundry Company, the Richland County Senior Citizens Home, and the Yuba Cheese Factory which is located upstream from a multiple-purpose structure and could adversely effect water quality.

Response: Concur. These have been added on page 50 of the EIS.

(6) Comment: It is proposed to use cold water from the bottoms of the two multiple-purpose reservoirs to reduce temperatures in the Pine River during summer months. Although water from the bottoms of the reservoirs should have a lower temperature, dissolved oxygen could be critically low. Measures should be taken to assure no degradation of water quality in the stream below those reservoirs.

Response: Concur. Page 56, paragraph 4, a statement has been added to explain aeration features built into the multiple-purpose structure.

(7) Comment: A dry dam is proposed at site 21 on Melancthon Creek, which has been described as the best trout water in Richland County. Migration features are to be installed to aid spawning fish. The EIS should describe the effectiveness of the migration features and discuss the effects of floodwater retention on the spawning beds.

Response: Concur. A statement has been added to page 61 to explain migration features and their effectiveness. A statement has been added on page 65 regarding the effects of floodwater detention on the spawning beds.

(8) Comment: Private development could occur near the recreation sites and adversely effect water quality. State and local regulations to prevent water quality degradation should be described.

Response: Concur. A statement has been added on page 63.

(9) Comment: The water quality generally will be adequate to support use for water contact recreation and cold water fishery. The reduction of sediment and the control of liquid and solid agricultural wastes proposed by the project will result in water quality improvements.

Response: Comment noted.

Wisconsin Board of Soil and Water Conservation Districts
(agency designated to respond in behalf of the Governor)

(1) Comment: We concur in the project planned measures as described in the above documents and as adopted by the project's local sponsor, the Richland and Vernon County Soil and Water Conservation Districts. We note that the Pine River Watershed Associations received approval for planning assistance in 1961, fifteen years ago. The local sponsors have sustained the spark of community interest through many periods of disappointment and frustration, and we earnestly hope this plan can now be promptly carried through to completion.

Response: Comment noted.

(2) Comment: We also note, with concern, the reported tendency of the zoning authorities of Richland Center to grant variances to the city's flood plain zoning ordinances. The Board feels that the purpose of such ordinances is to protect private and public interests from flood damages, and that they must be strictly administered to be effective.

We urge that the Richland and Vernon County Soil and Water Conservation Districts strive by all available means to exceed the goals of the plan with respect to land treatment for erosion and sediment control, in

order to prolong the useful life of the water impoundments and maintain the highest possible water quality throughout the river system. The possibility of obtaining conservation cost-sharing funds through local or State appropriations should be considered.

Response: Comment noted:

Wisconsin Department of Natural Resources

Watershed Plan Comments:

(1) Comment: AGR-2 -- The sponsoring local organization may be eligible to receive 50 percent financial assistance through P.L. 566 for the acquisition of land rights necessary for the trout stream improvement project. The project proposes to acquire 6,160 feet of stream on Melancthon Creek to replace public easements on the Pine River and to undertake 4.5 miles of stream habitat improvement which will require additional easements. Federal cost-sharing assistance in acquiring these land rights would greatly strengthen this aspect of the plan.

Response: Comment noted.

(2) Comment: AGR-4, Item 7 -- There should be a contingency provision in the agreement assuring P.L. 566 cost-sharing assistance for land treatment measures in the event that other Federal assistance programs to landowners are not available or are inadequate to accomplish the needed land treatment measures projected in the plan. This might strengthen the role of land treatment in P.L. 566 projects.

Response: Comment noted.

(3) Comment: Page 1, paragraph 1 -- This statement would be consistent with similar statements if fish and wildlife improvement was added to the list of objectives.

Response: Concur. "Fish and Wildlife Improvement" has been added to the list of objectives on page 1, paragraph 1.

(4) Comment: Page 11, paragraph 4 -- The term "flood plain grouting" is confusing. Could it be either flood plain <u>routing</u> or <u>foundation</u> grouting?

Response: Wording has been changed from "flood plain grouting" to "foundation grouting".

(5) Comment: Page 15, paragraph 2 -- Reducing the sediment load in the Richland Center Mill Pond to less than three-fourths of the present rate has no apparent monetary value such as the projected $10,200 in annual benefits. The basin may be very close to its sediment equilibrium capacity. In paragraph 2, page 26 EIS, it is stated that sediment deposition has greatly decreased its existing value. If dredging were planned, the case might be different, but this action is not proposed.

Response: Sediment deposition reduction benefits were calculated as prescribed in the "Soil Conservation Service Economics Guide". The pond is used as a source of cooling water for the Richland Center Power Plant. It also provides fish and wildlife benefits as well as benefits as a recreation and esthetic resource. With the proposed structures installed as well as the land treatment measures, the sediment delivered to the Mill Pond will be reduced enough to allow restoration and maintenance of the pond.

(6) Comment: Page 15, paragraph 6 -- The $14,200 of annual benefits attributed to the conversion of 295 acres from pasture to cropland seems to assume that the hazard of flooding is the only deterrent to this conversion. Other factors, such as normal high ground water conditions; proximity of the fields to the streams and the attendant erosion hazard, reluctance to pasture woodlots and steep slopes to compensate for lost pasturage, and the dependence on off-farm employment may restrain the intended conversion.

Response: Approximately 600 acres of grassland could be converted to cropland based on flood protection provided by the project. The 295-acre conversion estimated is conservative based on studies conducted at other completed P.L. 566 watershed projects. This estimate inherently incorporates all of the deterrents stated.

(7) Comment: Page 15, paragraph 7 -- An unanticipated reduction in recreational use could seriously affect Richland County's ability to finance operation and maintenance of the recreation facilities. This is estimated to be $80,000 annually. Therefore, a brief discussion of the substantiating data from the SCS 1975 survey, its correlation to the selection of a "foundation" lake, and the methodology used for the comparative analysis would be very helpful in establishing confidence for the benefits proposed.

Response: Estimated recreational use and annual benefits for the two multiple-purpose structures were estimated in accordance with guidelines established by the Water Resources Council for planning activities. The attendance estimates were substantiated by a recreation use survey of P.L. 566 multiple-purpose reservoirs and subsequent gravity analysis conducted by Russell Pope of the Wisconsin Department of Natural Resources during the summer of 1975. Economic benefits are probably conservative based on a review of recently published studies. Current trends are toward a longer use season than considered in the analysis. Documentation and survey results are on file and available for review at the Soil Conservation Service office located at 4601 Hammersley Road, Madison, Wisconsin.

(8) Comment: Page 29, paragraph 6 & 7 -- This explanation does not demonstrate the financial capability of the sponsor to carry out the project. Your letter of March 23, 1976, in response to our general comments on the preliminary draft offered some pertinent information on this subject that should be included in this Draft Statement. This type of economic analysis is essential in order to assure that the Service as well as the Sponsor is not proceeding with a selected plan that is impractical in terms of local financial capability.

Response: Richland County has demonstrated its ability and willingness to finance obligations of this magnitude. The additional tax burden created by $3,091,700 for structural improvements and critical area stabilization has been examined by the Sponsors and is not expected to be an undue hardship.

(9) Comment: Table 1 -- The accelerated land treatment program calls for an expenditure of about $500,000 for diversion and floodwater retarding structures on forest land installed under the supervision of the Soil Conservation Service. It would seem appropriate in the section on the Planned Project to elaborate on the number and relative size of these structural measures; to show in the section on Problems the need for placing these on forest lands as opposed to crop or pasturelands; and, to describe in the Environmental Impacts section, the effect of these developments on the forest resource in terms of the amount of forest area disturbed and the possible effects of sedimentation on headwater streams as a result of the initial construction.

Response: Concur. The Planned Project section (part II, page 10) has been revised. The footnote on table 1 has been revised for clarity and the environmental impacts of the small on-farm floodwater retarding structures have been included in the Environmental Impacts section of part II. It should be noted that approximately one-fourth of the total number of small on-farm floodwater retarding structures will be constructed on forest land.

(10) Comment: Other -- It should be noted in the work plan that as a matter of State policy, no P.L. 566 structural measures can be built until the requirements of Wisconsin Administrative Codes NR115 and NR116 regarding flood plain and shoreland zoning are met. At such time that the watershed works of improvement are installed and operative, the affected governmental units may reduce their protection levels accordingly.

Response: Requirements of NR115 and NR116 have been met. Page 8, part II has been modified to include a reference to NR115.

EIS Comments:

(1) Comment: Page 1, V -- The reference to "incidental recreation" in connection with the two multiple-purpose lakes is a misleading summarization. Over three million dollars, or about 70 percent, of the total cost of these structures can be attributed to recreational purposes.

Response: Concur. The work "incidental" was misplaced. It has now been inserted in the correct location.

(2) Comment: Page 1, V -- In addition to the 436 acres of cropland removed from production as mentioned, another 404 acres should also be removed from the retarding pools or risk induced flooding.

Response: Changes to reflect increased risks on 404 acres of cropland have been made on pages 2, 59 , and 65 of part II.

(3) Comment: Page 2, V -- According to this summary, 18.2 miles of stream are affected by the structures, but the Impact Summary chart indicates 17.2 miles affected.

Response: Concur. Miles of stream in dry sediment pools have been corrected on page 2. Draft EIS figure was 4.3, but should have been 3.3 miles. A total of 17.2 miles will be affected by the project.

(4) Comment: Page 17, paragraph 9 -- The implication that new trout spawning areas will be created in Melancthon Creek by artificial techniques should be discounted. In Wisconsin streams this is a very marginal proposition. The existing natural trout reproduction in this stream will continue to be dependent on the natural spawning areas located near the site of the proposed dry sediment pool. If the dam hampers trout migration upstream, obliterates spawning areas in the sediment pool, or permanently consolidates sediment in downstream reaches, we would expect natural reproduction to be reduced accordingly.

Response: The intent is to provide gravel in the hope that it will be used for spawning. There is no guarantee that spawning areas will in fact be created. The paragraph has been modified. We concur that trout reproduction will continue to be dependent on natural spawning areas. Possible reduction in natural spawning areas is discussed on page 65 , part II.

(5) Comment: Page 33, paragraphs 4, 5, 6, 7 -- The description of the fishery resources of the Pine River watershed is not adequate. The lead paragraph combines streams and oxbow lakes in a simplistic description of the warmwater fishery and further generalizes that this description is the standard of the fishery in the county. There is no distinction or significance

given to the abundance of coldwater streams or coldwater fish species throughout the upper watersheds of the county. The next three paragraphs deal with two site specific stream surveys that have little relevance to the fishery resource being described. Subsequent paragraphs reference numerous Wisconsin Department of Natural Resources stream surveys, but the presentation fails to use this information to develop a clear perspective of the coldwater fishery in the watershed.

Response: The entire description of the fishery resources has been revised in response to your comment. (See pages 33 through 35, part II. Also, maps showing stream fishery resources have been added in appendix C.)

(6) Comment: Page 46, paragraph 4 -- The project proposes a substantial investment of Federal and local funds to satisfy recreational needs. However, no specific demand/needs data are offered to support the estimates of expected use or to substantiate the generalization that water-based recreational facilities at the Wisconsin River, Blackhawk Lake, Plain Honey 3, or West Fork of the Kickapoo are presently overtaxed.

Response: This paragraph has been modified to delete reference to existing facilities being "overtaxed". It has been restated that many recreationists cannot be accomodated and therefore must go elsewhere or forego recreating. See response to the watershed plan comment (7).

(7) Comment: Paragraph 6 -- In addition to the improved stream flow as a result of higher precipitation, it can be observed that ground water discharge has also benefited from a reduction of intensive agricultural activities in areas occupied by absentee landowners. It is anticipated that this ownership trend will continue and along with the accelerated land treatment program should further stabilize spring flow and sustain an improved trout fishery indefinitely.

Response: The paragraph has been revised to reflect the problem more specifically.

(8) Comment: Page 53, paragraph 4 -- Assuming 295 acres of flood-vulnerable pasturelands are converted to cropland as proposed, there is no practical reason to expect that this change would result in better resource management. The likely adverse impacts of this conversion include increased soil disturbing activities near streams and attendant erosion, increased wetland drainage, and more intensive pasturing of woodlands and grasslands on steep slopes. Also, with the continued interest in cash cropping, there is little basis for the proposition that the steeper upland fields will be retired from cultivation in the readjustment process.

Response: Comment noted. Possible impacts of land conversion will depend on individual management practices. Historically these adverse effects have not occurred.

(9) Comment: Page 54, paragraph 5 -- In regard to the "moderating" influence of the two multiple-purpose sites on upstream water effecting downstream water quality, we suggest that increased ammonia toxicity and BOD stress may be particularly important moderating possibilities.

Response; The effects of ammonia toxicity and BOD stress will be minimized by aeration of water discharged from the lake. Paragraphs 4 and 5 on page 56 have been modified to explain the aeration facilities.

(10) Comment: Page 54, paragraph 5 -- Specific water quality data developed from the comparisons made with the other man-made impoundments should be presented. The particular measurements of the "similar parameters above and below" the comparable impoundments would give a degree of substance to these investigations.

Response: We have random water quality samples on file which were taken above and below existing P.L. 566 impoundments, but they do not have the reliability of programmed sampling procedure used at the Pine River sites. Therefore, we have deleted the reference to "similar parameters above and below". The sentence now reads "Predicted conditions at MPS's 2 and 36 are based on an analysis of existing water quality above and below the impoundment sites and a comparison of conditions at existing comparable P.L. 566 impoundments.".

(11) Comment: Page 54, paragraph 6 -- The conclusion that the multiple-purpose impoundments will result in a good quality resource desirable for water contact sports and supportive of a good lake fishery is an important finding. The validity of this prediction, however, rests not only in attaining but in sustaining the proposed benefits over the amortization period of the investment. Considering the general progressive obsolescence of impoundments located in agricultural watersheds and the additional risk of accelerated obsolescence of special benefits such as water contact sports and fishing as forewarned by known water quality parameters, it can be assumed that some benefits may expire sooner than the 100-year design life of the impoundment. The ultimate decision to build must be based at least in part on a realistic understanding of the useful life period of the recreational benefits and the degree of socioeconomic disruption, if any, that can be anticipated when these benefits permanently cease.

Response: Comment noted. The paragraph has been modified to delete reference to the subjective terms "good" and "fair". With reasonable management, there is no basis for expecting benefits to expire sooner than the 100-year evaluation period.

(12) Comment: Page 55, paragraph 5 -- No impacts are described for the proposed relocation of State Highway 80 over County Highway C through Melancthon Creek valley. The stream is immediately adjacent to the present road for a distance of 6 miles and the two intersect at seven locations. The stream and trout fishery could suffer significant harm from channel work and sedimentation during reconstruction of this road.

Response: Rerouting of Highway 80 is a proposed jurisdictional change. The plan does not include reconstruction of Highway C; therefore, no impacts are evaluated.

(13) Comment: Paragraph 7 -- The impact of the structural measures on perennial streams should be discussed in a more logical and comprehensive manner. The reference to "7.2 miles of approximately 200 miles of perennial stream in the watershed will be inundated by a 100-year flood event" is apparently an attempted explanation of the impact of the retarding pools on perennial streams. One

could also interpret the statement to mean that 192.8 miles of stream in the watershed will receive such protection that they will not exceed bank-full levels even during the 100-year flood event! Additional references to stream modification indicated on page 54, paragraph 2, 3, and 5; page 57, paragraph 3 and 7; and page 59, paragraph 1, 2, and 4 deal mainly with enhancement features and project justification rather than the impacts on the ecology of natural perennial streams and trout fishery.

Response: Comment noted. Changes have been made for clarification.

(14) Comment: Dam sites numbers 21, 11, and 33, as presently located, would destroy significant trout habitat. In the case of number 21 on Melancthon Creek, it is also anticipated that gravel deposits within the flood pool that are vital for brook trout reproduction would be buried in sediment.

Response: All structures except the dike system will "alter" trout habitat. Sites 11, 21, and 33 will have more impact than the rest. The Adverse Impacts section, page 65, has been modified.

(15) Comment: On page 62, paragraph 10, there is a second but more accurate reference to the "7.2 miles of perennial stream", and on page 63, paragraph 1, a vague reference to adverse effects on trout water. In summary, all the references cited do not add up to an adequate effort to describe and quantify the important impacts associated with the total 17.2 miles of perennial streams directly effected by the dams. In addition, there are unaddressed, secondary impacts to consider having to do with the reduced resource base available for the pursuit of trout fishing recreation and the introduction of warm water fish species and their distribution potential from impoundments into connected trout waters and the resulting predation on young trout.

Response: Modifications have been made on page 65, part II in an effort to more adequately describe adverse effects. Alterations in the trout stream resource base have been discussed. According to watershed residents, recreation use of the trout streams in the areas to be affected by structural measures is relatively low, but specific quan-

titative data is lacking. Possible problems associated with the introduction of warm water fish species will be minimized by measures specified by the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources during final design and in the operation and maintenance plans. See item 7, page 22, part 1.

(16) Comment: Page 61, paragraph 1 -- The reference to 100 percent reduction of floodwater damage to Richland Center should be qualified by the phrase caused by the Pine River.

Response: Concur. This paragraph has been revised as suggested.

(17) Comment: Page 62 -- For additional clarification, an explanation is required on the impact on the forest resource in the watershed resulting from a proposed expenditure of about $500,000 for diversions and floodwater retarding structures on these lands and the relationship between the objective of this effort and the objectives of the forestry program for cattle exclusion and tree and shrub planting.

Response: The forest land practices (such as livestock exclusion) will compliment the flood and sediment reduction, and forest land stabilization benefits from the small on-farm floodwater retarding structures. See response to watershed plan comment (9).

(18) Comment: Page 63 -- The following additional impacts are reasonably apparent and should be stated:

1. The secondary impact of private recreational development, as prompted by the establishment of the recreational lake at site 36. For instance, its effect on the rate of conversion of cropland to recreational use and the likely effect on property tax payments required by local farmers as a result of accelerated land prices.

2. Drowning is an ever-present risk of lake use and is probably even more relevant in this context than in regard to flood events in this watershed.

Response: Item 1 is noted, but based on experience at other recreation developments of this nature, it is unlikely that the project will have any noticeable impact on tax payments or land prices. Item 2 has been added as an adverse impact.

(19) Comment: Page 71 -- Short-term vs. Long-term Use of Resources. In a previous comment directed to page 54, paragraph 6, we posed the question about the useful life of the recreational lakes for serving the intended purposes of active water-based recreational activities and recreational fishing. This section should squarely face the prospect of progressive lake eutrophication and appraise, at least in general terms, the possible need and probable cost of such intermediate and costly management techniques as lake aeration, fish stocking, water drawdown, rough fish control, and aquatic vegetation control. These operations go beyond normal maintenance, but they are so often necessary in order to maintain the recreational benefits of artificial lakes even over the short term.

Response: Comment noted. See response to comment (11). Operation and maintenance costs set forth in the plan are adequate to maintain the visitor-day use over the projected life of the project.

(20) Comment: Page 73 -- Irreversible & Irretrievable Commitments of Resources. We recommend that this section describe the irreversible losses of natural stream. Significant reaches of natural stream would be directly lost or greatly changed by structural works and the amounts can easily be quantified. While the project proposes some stream enhancement features and incorporates the replacement of certain existing public stream easements, we see no logic for the omission of the irreversible losses concerning this resource.

The taking of cropland for irreversible noncrop uses has become increasingly indefensible. It should be described in clear terms that about 840 acres of cropland are so committed in this proposal.

Response: 17.2 miles of natural stream will be altered by the project measures (see page 60). Of this amount, 2,530 feet of stream replaced by conduits through the dam embankments will be irreversibly and irretriev-

ably lost. The remaining 16.3 miles will be altered but not irreversibly or irretrievably lost. Stream channel replaced by conduits has been added as an irreversible and irretrievable commitment of resources. Cropland converted to dams, spillways, sediment pools, and recreation uses is considered to be irreversibly and irretrievably commited. Cropland subjected to increased risk of occasional short duration flooding in flood pools is not considered to be irreversibly and irretrievably commited.

Advisory Council on Historic Preservation

(1) Comment: Your draft environmental statement appears adequate concerning our area of interest, and we have no comments to make at this time.

Response: Comment noted.

Students, Wildlife Ecology 550 Course; Dr. Robert L. Ruff, Professor

Watershed Plan

(1) Comment: Principles and Standards Phase-in Addendum; Selected Plan, Social Well-Being Account. Only benefits have been included in Section A. Negative aspects should be included.

Response: Negative effects are included in item 3.

(2) Comment: Section B should also include such threats to life, health, and safety as increased vector breeding sites, decreased safety due to increased traffic, increased noise and air pollution from autos.

Response: Concur. Suggested items have been added.

EIS Comments:

(1) Comment: It is stated in the summary sheet; part IV, Description of Project Purpose and Action that the primary objective of this project is watershed protection achieved through the application of land treatment practices supplemented by floodwater retarding structures. Planned project

expenditures are 31 percent for land treatment and 65 percent for flood control. Furthermore, the summary of the Plan states that frequent and severe flooding is the principal problem. Consequently, the following reordering of stated priorities would be more appropriate: (1) flood prevention, supplemented by (2) watershed protection, (3) recreational development, and (4) fish and wildlife improvement.

Response: The words "supplemented by" have been deleted. They were not meant to infer purpose ranking. Watershed protection and flood prevention are both primary purposes. However, watershed protection is the first increment considered. Planned expenditures are a poor indicator of primary or principal purposes because of the differences in the means or kinds of measures needed to achieve goals. Flood prevention which frequently requires extensive structural measures and/or comprehensive flood plain management programs usually costs much more to accomplish than watershed protection which can be achieved by simple changes in management or the application of small structural measures.

(2) Comment: In the Project Purposes and Goals section, enhancement of the watershed environment should be expressed as one of the basic objectives.

Response: The Sponsors established the objectives of this project. The enhancement of the watershed environment is inherent in their goals.

(3) Comment: Project Purposes and Goals, Recreational Development. If in fact the recreational facilities of site 2 and 36 are necessary to fulfill the needs of the region, how is their implementation consistent with the spirit of the Wisconsin Outdoor Recreation Plan of 1972?

Response: The planned recreational developments supplement the regional plan.

(4) Comment: Planned Project, pages 9-12 (general comment). The discussions of the land treatment and structural measures which will significantly affect the visual character of the Pine River watershed are very general and do not

contain references directly relating to their use in the watershed. Specific descriptions, including photographs, would be helpful in determining their overall appearance and application in the watershed.

Response: Some specific descriptions have been modified.

(5) Comment: Planned Project, page 9, paragraph 6. Livestock exclusion from woodlots is one measure of land treatment to be applied. However, it is later stated that only 18 percent of the livestock exclusion designated as needed under current conservation plans has been installed. This is the lowest installation level of the seven land treatment measures mentioned. Some explanation is needed as to why this phase of land treatment has been given so little attention in the past. Furthermore, what assurances are there that cooperation under the accelerated program will be any better than the rather poor level obtained under the ongoing land treatment program.

Response: The ongoing land treatment program emphasizes work on problem areas. This is due in part to limited personnel. When the project installation begins, employees engaged in planning and implementing land treatment will be increased. Since the application of land treatment measures is voluntary, no specific assurances can be made. However, our experience indicates that the amount of land treatment applied, especially with management aspects, depends heavily upon the availability of technical assistance.

(6) Comment: Planned Project, pages 9 and 11. In that "weeding" and "timber stand improvement" imply removal of vegetation which competes with commercially valuable timber, these practices will reduce food, cover, diversity, and, therefore, wildlife in the community. What wildlife considerations will be incorporated into these practices?

Response: Comment noted.

(7) Comment: Planned Project, page 10, paragraph 4. The impact statement does not indicate what types of plants are

to be used in critical area plantings. Native species could contribute much to preservation and enhancement of the character of the watershed environment. Consideration should be given to the development and use of native species for critical area planting.

Response: Plants to be used will vary by site. Native species will be used when practical. Technical assistance for plant selection will be provided by an interdisciplinary team.

(8) Comment: Planned Project, page 13, paragraph 3. The size of the structural measures indicates that they will have a very significant effect on the existing land forms of the region by interrupting the valley vistas and inundating rock outcroppings. There is no evidence in the impact statement indicating that esthetic effects of structural measures were considered in their site selection and design. The EIS states that ". . . structural works were selected based on physical site location or feasibility". What were the specific criteria used in these decisions?

Response: The decisions were based on the judgement of an interdisciplinary team in consultation with local officials and compliance with SCS criteria and guidelines. The criteria and guidelines are available at our office at 4601 Hammersley Road, Madison, Wisconsin.

(9) Comment: Planned Project, page 13, paragraph 5. It is difficult to concede that the impoundments at sites 2 and 36 will indeed be designed to preserve and improve the existing fish resources. According to the EIS on page 54, paragraph 5, the Environmental Impacts section, "Predicted changes under future impoundment conditions are at best speculative". Since changes will occur (although the magnitude and specific nature of these changes is unknown), preservation and improvement of the existing fish resources is not possible.

Response: Concur. This statement has been revised to read ". . . structures are designed to minimize adverse effects on existing . . .".

(10a) Comment: Planned Project, page 15, paragraph 9 and 16, paragraph 8. The importance of an environmental buffer beyond the P.L. 566 cost-sharing boundary should be emphasized in the EIS. The EIS states that Richland County "intends" to purchase additional acreage for an environmental buffer and possible future expansion. What assurance is there that this purchase will be made?

Response: Comment noted. Richland County has already purchased outside of the P.L. 566 cost-sharing boundary at site 2.

(10b) Comment: Planned Project, page 16, paragraph 8. In light of the tentative nature of the land purchases, the conceptual plans for sites 2 and 36 should be altered so as to clearly indicate that the park boundaries could be less than that shown. Likewise, it should be made clear that certain activities could occur precariously close to private residences, i.e., the walk-in campsites at site 36 may be unsuitable if such development should occur. The plan should also provide a key to vegetation type, slope, etc., to clearly indicate how the various activities and facilities will interact with the environmental setting. For example, it should be noted whether campsite and trail settings are open or wooded, and whether or not they intrude on fragile plant communities. How well do the conceptual plans for sites 2 and 36 provide for esthetically pleasing experiences for a wide range of users?

Response: Vegetation and slopes were considered in developing the conceptual plan and will be considered when final plans are drawn. An inspection of the site by William Tans, Botanist, Wisconsin Department of Natural Resources, did not locate any rare or endangered plants on the route of the trail or in the vacinity of the campsites. The proposed walk-in camp area is located in a grassy area which is sheltered on three sides by wooded slopes and is open to the reservoir on the remaining side. Project boundaries and the placement of proposed facilities would preclude interference from private development. Boundaries are shown on figures 2 and 3, appendix E.

(10c) Comment: The establishment of a nature conservancy is surely an asset to any area that has one. However, the viability of a true conservancy must be addressed in terms of the

ecological integrity of the activities that take place there. That is, if the plan calls for a nature conservancy, any plans for trail bikes and snowmobiles must be scrutinized or omitted. In addition, the type of boaters that use the impoundments could determine the character of the area. Site 2, for example, appears to be much too small for power boat activity, yet this subject was not addressed. What consideration has been given to the ecologic-esthetic effects of motorized recreation in the areas?

Response: Plans for site 36 include a nature-hiking trail, but not a nature conservancy per se. It will be recommended that trail use be limited to hiking and bicycle riding. Motorized vehicles would be prohibited if recommendations are followed. This recommendation is based upon a site visit by Botanist William Tans.

Motor boats will not be permitted on site 2 because of the small size of the lake.

(11) Comment: Planned Project, page 14, paragraph 6. The procedure for identifying borrow sites and obtaining borrow for the structures should be discussed more thoroughly. The topography, vegetation, and wildlife of these areas will surely be affected. These effects should be documented. If cropland is used for the borrow and then planted to grassland or wildlife habitat, this loss of cropland should be included as a cost of the project. If other lands are used, a discussion of both short-term and long-term effects is needed.

The locations of borrow sites are not mentioned. Such locations and attendant impacts of development should be supplied in the final EIS.

Response: Potential borrow areas were located from soils maps and aerial photographs and then reviewed in the field. Borrow needed in addition to the material excavated from spillway sites will be determined during field design. Borrow sites are usually located in crop and pastureland. The Planned Project section has been modified to include handling of topsoil and seeding. The short-term effect is a one-season loss of crop or forage. The landowner is compensated for this loss by easement payment.

(12) Comment: The EIS does not mention any plans for the establishment of game fish nor how such fisheries would be managed.

Response: SCS will request technical assistance from the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources regarding fish and wildlife features in the final design and operation and maintenance plan for each structural measure. Words to that effect have been included on page 22, part I, Installation Provision, and on page 22, part II, Planned Project. Historically, the Wisconsin Department of Natural Resources has assisted Sponsors with the fish management aspects of P.L. 566 impoundments. Game fish have been established at all impoundments managed for that purpose. Several P.L. 566 lakes are frequently mentioned in newspaper reports as good fishing spots.

(13) Comment: Planned Project, page 22, paragraph 2. (a) Construction of this project could ultimately remove 4,817 acres from the tax base of Richland County. An estimation of the average loss of revenue should be made and included in the EIS. (b) An estimation should be made of the mil-rate increase in property taxes to Richland County landowners which will be necessary to finance the project.

Response: The loss of revenue because of the removal of land from the tax base and the mil-rate increase in property taxes because of the project will be negligible.

(14) Comment: Environmental Setting, page 24, paragraph 5. It is stated that "No (geologic) faults were seen during the field reconnaissance" implying none were present. Several large joints are present in the vicinity of site 36. Water collected in the fractures during the winter will freeze and expand causing damages that would add to construction and maintenance costs.

Also, water will travel through these fractures directly into the lake without being purified by passing through soil or sandstone.

Response: Paragraph 5 was modified to include a discussion on jointing. Recreational facilities will have a water disposal system designed to ensure non-pollution of the man-made lakes. During the layout of facilities, additional field studies will be made to avoid siting

of trails, walkways, parking lots, or buildings in areas underlain by open rock joints or other unstable or hazardous earth material. Sufficient costs were also included in the estimates to take care of any contingencies that might occur.

(15) Comment: Environmental Setting, page 27, paragraph 6 and page 28, paragraph 1. What is the minimum total phosphorus content? Is it 0.00 to 0.03 (page 27) or is it 0.06 to 0.10 (page 28)? Also, if maximum values occurred during periods of surface runoff and total phosphorus concentrations under base flow conditions were higher than those in the headwaters, then why "during periods of surface runoff values obtained were comparable to those observed at the headwater sites."?

Response: Concur. Error corrected on page 27.

(16) Comment: Environmental Setting, page 29, paragraph 2. Due to agitation and greater surface contact of water in streams, the dissolved oxygen (DO) concentrations are inadequate to provide an idea of the DO concentration when such waters are impounded. The use of the Biological Oxygen Demand (BOD) would provide a better idea of the DO of such waters when impounded. The BOD should have been included in the testing.

Response: DO depletion in the hypolimnion is a generally accepted fact. Hence, BOD data in a healthy stream are of little value in predicating the DO levels to be expected in a proposed reservoir.

(17) Comment: Environmental Setting, page 29, paragraph 4. The Committee on Water Quality for the U.S. Secretary of the Interior has determined that water for primary contact recreation should not have a fecal coliform count exceeding a log mean of 200/0.1L with not more than 10 percent of the sampling exceeding 400/0.1L. Wisconsin statutes have identical requirements for water quality. In view of the foregoing, what justification can be given for the establishment of recreational water (including swimming) in the Pine River watershed which already has values, as stated in the EIS, which greatly exceed the above mentioned limits?

In addition, if planners for the project anticipate that stream self-purification or retention ponds will remove harmful organisms from the water, additional documentation is needed. More specifically, unless the coliform count is reduced to acceptable levels in time periods less than the literature values for survival of the bacteria of 2 to 7 days, a potential health hazard will exist. Hence consideration should be given to what effects this may have on the B/C ratio because of the recreational benefits that may be foregone. Included in this should be the amount of recreational benefits lost that are attributable to swimming and the amount of other types of recreational benefits lost because of the stigma associated with the use of facilities near polluted water.

Response: Comment noted.

(18a) Comment: Environmental Setting, page 29, paragraph 4. What data have been collected on the Pine River to indicate that Samonella, Leptospirosis, and Mycobacterium tuberculus would not be a problem?

Response: As pathogens are of sporadic occurrence, bacterium counts of certain companion organisms such as coliforms or fecal streptococci are usually used as indicators of the presence of pathogens. These counts have been performed. Unless there is evidence of abnormal coliforms, standard tests are considered adequate.

(18b) Comment: Environmental Setting, page 30, paragraph 3. It would be valuable in determining the character of the water if the organisms were included in the appendix. The use of a species diversity index could improve the evaluation of the extent of any suspected disturbances.

Response: The requested list of organisms and a diversity index have been added. However, we do not agree that a diversity index is useful for comparison of changes in the aquatic community due to impoundment.

(19) Comment: Environmental Setting, page 34, paragraph 2. The waters of two wet sediment pools at sites 7 and 33 will be liable to considerable heating on warm days due to their shallowness. Such temperature increases when

transferred to the streams below the structures could have a detrimental effect on trout production. This would include lethal effects on eggs during incubation because elevated temperatures increase the oxygen demand of eggs. The effect of the heating at site 7 could extend as far as Fancy Creek. Greater attention is needed in the statement as to the effect of the pools at sites 7 and 33 on Fancy Creek.

Response: Temperatures in the wet sediment pools are expected to rise in mid summer. Trout spawning occurs in early spring or late fall depending upon the species. Stream temperatures below these structures are not expected to increase because of the proposed outlet structure.

(20) Comment: Environmental Setting, page 34, paragraph 3, and page 35, paragraph 1. The EIS states that wildlife habitat conditions are above average and that wildlife resources are generally abundant and highly valued. These statements do not define "above average habitat" or "generally abundant and high valued" wildlife resources, and they totally lack documentation.

In addition to the lack of any wildlife assessment by SCS personnel, other available and directly pertinent information was not included. A list of mammals, birds (by season), amphibians, and reptiles of the Pine River Watershed was prepared by the Wildlife Ecology 550 class at the University of Wisconsin-Madison in 1975. The list was incorporated into a Draft Environmental Impact Statement and included a complete set of references. This available information should have been more extensively utilized to support the above statements.

Response: As indicated in the EIS, "above average" wildlife habitat conditions imply that essential habitat elements including food, cover, and water are abundant and well distributed. It is generally accepted that diversity of habitats and quality of management, i.e. ungrazed woodlots, are indicators of high quality conditions for a wide variety of wildlife. It is in this light that "above average" is used in the EIS and could be compared to "below average", i.e. extensive monocultural areas such as row crops.

Biologists and resource planners from SCS, the Wisconsin Department of Natural Resources, and the Extension Service did perform wildlife habitat assessments in the Pine River watershed.

Species lists, although a valuable tool in assessing environmental impacts and writing an EIS, are generally not incorporated into the EIS document. Such lists are a part of the basic data file and are utilized as deemed necessary.

(21a) Comment: Environmental Setting, page 36, paragraph 6. The EIS acknowledges the presence of archeological materials at site 36 and states that all artifacts will be preserved, but fails to list any plan as to how this preservation effort will be accomplished.

Response: Changes have been made in the archeological and historical values and unique scenic areas section to reflect more current information. Procedures for preservation of cultural materials will be accomplished as outlined on page 18, part II.

(21b) Comment: In addition, high priority should be given to the protection and enhancement of the area's unique character. The Wisconsin Outdoor Recreation Plan has proposed the designation of State Highway 80 from Rockbridge to one mile south of Yuba and from Highway 193 to one mile south of Richland Center as scenic roadways. Site 36 will inundate a sizable portion of this scenic road. Site 2 will likewise have altering effects on the southern section. The EIS failed to address the fact that uncountable esthetic and recreational benefits may be lost by the alteration of these roadways.

Response: Comment noted.

(22) Comment: Water and Related Land Resource Problems, pages 39-45. An environmental impact statement should be just what the title implies and NEPA demands. The use of six pages of text (pp. 39-45) containing six old photographs and some old newspaper articles is unjustified. By giving unequal weighting to educating the reader of floods of the past, other important aspects of the environmental impact analysis are slighted. This space could

be devoted to a more thorough examination of the esthetic social and environmental impacts of this project or at least divided between discussions of the other water and related land resource problems.

Response: Comment noted.

(23) Comment: Water and Related Land Resource Problems, page 47, paragraph 1. Populations of upland game and wildlife in general have faced destruction of habitat not only due to loss of farm and roadside hedgerows, but additionally as the result of overgrazing of woodlots, increased numbers of feedlots on the Pine River and its tributaries, overgrazing and drainage of wetlands, and exclusion of fallow fields in crop rotation practices.

Response: This generalization, to our knowledge, is not documented or substantiated by any specific assessments in the Pine River watershed.

(24) Comment: Relationship to Land Use Plans, Policies, and Controls; page 49. The following information should be included in this section: To date some 30 exemptions to the flood plain zoning ordinance have been granted in Richland Center, and few residents of Richland Center are participating in the Federally subsidized flood insurance program.

Response: Concur. The information has been added. It was mentioned in part on page 8, part II.

(25) Comment: Relationship to Land Use Plans, Policies, and Controls; page 49, paragraph 4. It should be stated as to whether or not the proposed watershed measures, including the recreational facilities and the attendant potential for off-site commercial and scattered-site housing developments, are consistent with the stated objectives of the Richland County Land Use Plan.

Response: Richland County does not have a land use plan.

(26a) Comment: Environmental Impacts, pages 51-52. The proposed land treatment practices are relatively inefficient at controlling nutrient runoff from agricultural land. The only nutrients

that are controlled by the practices are those absorbed on particulate matter (mostly clays). During periods of surface runoff, only about 25 percent of the total phosphorus is associated with particulate matter, and at base flow, less than half of the phosphorus is absorbed on particulates (page 28, paragraph 1). These particulate nutrients are controlled at about the same rate as erosion control of the clay particles. But the dissolved nutrients, nearly 75 percent of the phosphorus, and essentially all of the nitrate, is virtually uneffected by erosion control practices. Therefore, MPS 2 and 36 will have high nutrient loading rates regardless of the implementation of the accelerated treatment plan. A reduction in suspended solids from streams, if not accompanied by similar nutrient reductions, could result in undesireable consequences such as a profusion of algal blooms as increased light penetration stimulates photosynthesis.

Response: Comment noted. Erosion control practices such as strip cropping reduce nutrient runoff in several ways. Nutrients such as phosphorus that are attached to soil particles enter water courses at a rate proportional to sediment delivery. Soluable forms of phosphorus enter at a rate proportional to runoff. Therefore, the land treatment practices that reduce soil erosion and retard runoff also, coincidentally and effectively, reduce nutrient runoff, both soluable nutrients and those attached to soil particles.

A good treatise of the subject was published by the Illinois State Water Survey, Circular 111, entitled "Nonpoint Rural Sources of Water Pollution" by Shundar Lin, 1972, Urbana, Illinois.

(26b) Comment: Practices outlined in Agricultural Waste Management Field Manual, USDA, SCS, 1975, should be employed and encouraged and could have been presented as part of the land treatment measures in the Planned Project section.

Response: The field manual is used extensively by our field personnel and others. The discussion on agricultural waste systems has been modified for clarification on page 9, part II.

(27) Comment: Environmental Impacts, page 51, paragraph 6. The EIS states that 295 acres of pasture would be converted to cropland due to flood protection (p. 53) and 353 acres of pasture would be inundated by wet sediment pools (p. 55). If livestock numbers remain the same, overgrazing and increased soil erosion could occur on the remainder of pasture lands. Such impacts should be discussed. On the other hand, if livestock numbers are reduced to allow for the net loss of pasture, the stock reductions could be considered as a project cost. This too should be discussed.

Response: Overgrazing and increased erosion is not expected to occur because with more intensive farming, cattle are being moved from pasture to feedlots, utilizing the pasture for forage crops (green chopping). Many pastures are currently undergrazed.

(28) Comment: Environmental Impacts, page 52, paragraph 1. The exclusion of livestock from streambanks should receive greater emphasis. The dangers of increased soil erosion, soil compaction, and nutrient loading caused by livestock use of streams should be described. It is recommended that streambank fencing be considered for critical area treatment and hence become eligible for P.L. 566 funds. Also, alternative sources of water for livestock should be investigated while keeping stream access areas to a minimum.

Response: Comment noted.

(29) Comment: Environmental Impacts, page 54, paragraph 5. The lakes used for comparison should be listed here or at least in the appendix, including the values used for comparison and the condition of the water and fisheries of the lakes.

Response: The paragraph was modified to reflect that P.L. 566 lakes were used for comparison. The comparable P.L. 566 lakes located nearby are Blackhawk and Twin Lake (Governor Dodge Park) in Iowa County; White Mound in Sauk County; Sidie Hollow, and Jersey Valley in Vernon County. Two other P.L. 566 lakes with similar watershed and site conditions are Nugget in Pierce County and Glen Hills in St. Croix County. Birch Lake in Iowa County could compare with the wet sediment pools.

(30) Comment: Environmental Impacts, page 54, paragraph 6. In brief, the impoundments will most likely exhibit characteristics far removed from those of a good quality resource. The excessive algal and macrophyte growth will choke the open water areas of the lakes, perhaps foul the air with the decomposition of plant material, consume deep-water oxygen that could be used by fish and other animals, and accumulate organic sediments which could diminish the floodwater storage utility of the structures.

Response: See response to comment (12). Also, adequate space is provided for sediment accumulation including organic material.

(31) Comment: Environmental Impacts, page 55, paragraph 1. Even if the impoundments were to be filled by water under base flow conditions, a potential for algal blooms nonetheless exists. When one considers values obtained during runoff periods, the levels of nutrients increase along with the potential for blooms. Furthermore, the above data do not include other forms of nitrogen (molecular and organic) and phosphorus (particulate) which may be available directly to algae. Because of these facts, a potential for major algal blooms exists and should be stated accordingly in the EIS.

Response: The statement has been modified to read ". . . there is a potential algal bloom problem . . .". Our experience does not indicate that it will be a major problem.

(32a) Comment: Environmental Impacts, page 55, paragraph 1. Mixing of water occurs in the upper layer of the lake. Because of upper layer mixing and continual nutrient input, algal growths will probably occur on any of the surface areas of the lakes even though the highest concentration may be in the upstream region.

Mention is made of upstream retention pools at site 36 without any discussion of their impacts or cost, nor how such retention pools would improve water quality or its health safety. If these pools were managed as marshes there could be substantial gains in terms of wetland improvement in the watershed.

Response: Comment noted.

(32b) Comment: Environmental Impacts, page 55, paragraph 1. Fair water quality with algal blooms and high fecal coliform counts are anticipated at both of the recreational impoundments. Since recreational demand is, to a significant degree, a function of the water-based activities to be provided, and since low water quality is expected, the estimates of recreational visitations and recreational benefits seem overstated. Hence, the B/C ratio would also be inflated. This aspect needs additional comment in the EIS.

Response: Compared to existing P.L. 566 impoundments, both sites should have water quality suitable for water contact sports as well as fish and wildlife uses. See page 57, part II.

(33) Comment: Environmental Impacts, page 55, paragraph 5. The implications of rerouting roads around the structure sites should receive additional attention. Specifically, this should at least include consideration of travel distances and time changes in school bus routes, mail delivery, milk pick-up, and access by farmers to their fields.

Response: No significant change in travel time or distances is expected. Generally, the road relocation consists of raising roadways above expected flood pool levels at structure sites.

(34) Comment: Environmental Impacts, page 56, tabular data. The issue of changed and inundated wetlands at the structure sites demands more attention in the impact assessment. Anticipated recreational use may preclude full development of wetlands at sites 2 and 36. Increased human disturbance at these sites will likewise diminish the utility of wetlands for wildlife.

In addition, the secondary effects of flood protection on wetlands should be described. For example, the wetlands below floodwater retarding structures which are maintained by periodic flooding will probably be subject to more intensive land use (e.g. pasture or conversion to cropland). This would also apply to those wetlands near the Hub City Bog which will be protected by the dam at site 36. Such protection may encourage farmers to drain these wetlands for conversion to pasture or cropland. The resultant influx of nutrients into the bog would only add to nutrient overloading. Hence, the biologic integrity of this

area could be threatened. Provisions, if any, for protecting the bog and other wetlands in the watershed should be described.

Response: Comment noted. The recreation sites are located away from the anticipated wetlands and should allow for wildlife use. Historically in Wisconsin, changes in wetlands below P.L. 566 floodwater retarding structures has not occurred.

(35) Comment: Environmental Impacts, page 57, paragraph 5. This paragraph only describes the facilities to be provided at MPS 2 and MPS 36, and in itself is not a description of any environmental impacts. The possible impacts of these facilities should be discussed, or this entire paragraph should be deleted.

Response: The paragraph has been modified.

(36) Comment: Environmental Impacts, page 59, paragraph 5. The methodology for determining that "adequate habitat" is present in the watershed for rare and endangered species should be described. A list of these species should also be provided.

Response: The sentence about "adequate habitat" has been deleted. See response to comment (20) regarding species lists.

(37) Comment: Environmental Impacts, Economic and Social Impacts, page 60. In light of the farmers' marginal <u>ability to pay for</u> the very costly <u>land treatment measures</u>, how much per capita ASCS cost-sharing assistance can be anticipated by these farm operators?

Response: This is unpredictable. Historically, ASCS has increased cost sharing for accelerated land treatment. During the past ten years over $3,500,000 has been spent on the installation of land treatment practices in the Pine River watershed. The expenditures for the 8-year land treatment program represent about a 10 percent increase over the land treatment expenditures for the last 10 years. Some land treatment will continue to be applied by individual landowners without formal assistance.

(38a) Comment: Economic and Social Impacts, page 60, paragraphs 1 and 6. The statement indicates that the threat of loss of life by drowning exists in the watershed, even though there is no documented loss of life by drowning during previous flooding events. This statement should, therefore, be deleted from the Final EIS because it is an apparently insignificant threat.

Response: While no documentation exists, the threat of loss of life by drowning does exist because of the channel velocities attained and the magnitude of discharges during flood events.

(38b) Comment: The potential risk of injury and loss of life attributable to recreational accidents and increased traffic at the multiple-purpose sites was inadequately addressed in the Draft EIS.

Response: Statements regarding the higher risk of injury and death due to recreational accidents and increased traffic induced by recreational facilities has been included on pages 62 and 63.

(39) Comment: Environmental Impacts, page 60, paragraph 2. It is stated that the "quality of man's environment" and "the quality of life" will improve as a result of flood protection. This is highly subjective. Flooding may also improve environmental quality because it curtails more intensive land use in flood-prone areas. In this respect, flooding "preserves" open space, wildlife habitat, plant and animal diversity, and therefore contributes toward environmental quality.

Environmental enhancement can be an integral part of a watershed project. Similarly, certain components can have a significant negative impact on the area's esthetic nature. Perhaps a section in the impact statement under "Environmental Impacts" should have specifically addressed how the various components contribute to esthetic enhancement or degradation. Those project measures to be dealt with in such a review could include the structures, lakes and recreation areas, borrow sites, various construction features and conservation land treatment.

Response: Comment noted.

(40) Comment: Environmental Impacts; page 60, paragraph 3, It is unclear that the opportunities for individual farmers or others will be significantly increased, as is stated, because farmers may lack the necessary skills to perform the 30 skilled positions that will be created.

Response: The section was modified for clarification.

(41) Comment: Environmental Impacts, page 60, paragraph 4. A brief summary should be presented regarding the type, amount, and annual normalized value of the increased productivity which is expected from flood protected areas. Also, the type, quantity and comparable values of agricultural production to be foregone on that portion of the 4,817 acres which will be converted to project uses should be presented. This will give readers some idea of the productivity increases which must be achieved in order to compensate for the real losses of production permanently foregone on many of the 4,817 acres which will be converted for project purposes.

Response: The net value of productivity is expressed in dollars. Briefly, this was determined by comparing crop yields with and without project conditions. A net increase in yields occurs with project conditions. The increase in yields because of flood protection is greater than the loss of the yields from lands required for project purposes. The production foregone is compensated for in land rights costs.

(42) Comment: Environmental Impacts, page 60, paragraph 7. No evaluation has been made of offsite induced costs to local government that would be caused by the influx of recreationists to MPS 2 and MPS 36. Induced costs would reflect additional police patrols, ambulance and fire calls, roadway maintenance, roadside litter removal, and the like.

Response: Comment noted.

(43) Comment: Environmental Impacts, page 60, paragraph 8. What assurances can be given that the intended environmental buffer around the recreational sites will be purchased by the Richland County SWCD? This buffer is necessary to preserve the natural character of the recreational areas and to prevent encroachment by residential development.

Response: See response to comment (10a).

(44) Comment: Environmental Impacts, page 60, paragraph 8. The statement . . . "may be disruptive to the present lifestyle of local citizens" is an insufficient assessment of the situation. There will be 142,800 annual visitations in a watershed of less than 10,000 people. Major impacts incurred by the resident population will surely result and these should be identified.

Response: Past experiences with P.L. 566 projects in Wisconsin indicate the trends suggested will not have a significant effect. Approximately 70 percent of recreation use is expected to originate from within the Pine River region. While use of the recreation areas will certainly influence the local economy and local traffic patterns, the region should have no difficulty accommodating changes. Consider that in Iowa County, an area not unlike Richland County, attendance which was estimated at over 400,000 annual visits in 1971 at Governor Dodge State Park has been accommodated without undue hardship.

(45) Comment: Favorable Environmental Effects, page 61, paragraph 1. What justification can be made for showing flood damage reductions from $269,000 to $0 annually in the urban areas of Hub City, Rockbridge, and Richland Center when some of the flooding in Richland Center has been attributed to runoff from the hill immediately east of town washing down the streets and overloading the sewer system?

Response: The flood damage reduction values are for floods caused by Pine River. The paragraph has been modified for clarification.

(46) Comment: Favorable Environmental Effects, page 61, paragraph 3. Has the increased erosion potential below the dam sites been taken into account in computing the reduction in sediment delivered to the Wisconsin River?

Response: Yes. Reduction in erosion because of reduced volume and velocity of flow below structures more than compensates for the increased erosion potential of a stream regaining a "poised" condition.

(47) Comment: Favorable Environmental Effects, page 61, paragraph 7. Please indicate if and how the low rate of response by farmers in the Coon Creek watershed, to the perception of changes in flood frequency, has been considered in the estimation of "changed land use" benefits for the Pine River watershed project to avoid overstating these benefits.

Response: Based on Theilor's report, Agricultural Economics Report 41, 1964, and interviews, the land suitable for conversion was reduced by one-half. However, with the increasing pressure for food production, additional land might be utilized for crop production.

(48) Comment: Favorable Environmental Effects, page 61, paragraph 9. It is stated that high quality grass cover will be provided for wildlife habitat at all dam sites. A description of the wildlife species that benefit from this cover, and the particular grass species to be planted should be included.

Response: Erosion control is the primary purpose of the grass cover. In the past the viability of the grass was maintained by mowing several times annually. At the urging of wildlife biologists and with the concurrence of agronomists, this management practice was restricted to limited mowing on embankments and spillways so wildlife could utilize the cover, especially ground nesting birds early in the season.

Seed mixtures for planting at structure sites usually consist of smooth brome (Southern or Sac), tall fescue (Alta or Kentucky 31) and either Empire birdsfoot trefoil or Emerald crown vetch. In areas away from embankment or spillways, plant materials such as shrubs and trees could be used.

(49) Comment: Environmental Impacts, Adverse Effects, page 62. Richland County supports the highest bobwhite population in the State. A costly quail habitat improvement program has been completed or is scheduled by the Wisconsin Department of Natural Resources at sites 9, 14, and 33. Bobwhite currently on the changing species list are not recognized in the EIS as being present. The loss of habitat for the bobwhite quail and the red-shouldered hawk also on the changing species list should be mentioned in the adverse effects.

Response: Bobwhite quail were inadvertently omitted. Some plant materials were furnished to the Wisconsin Department of Natural Resources by SCS for use on a trial basis in their quail habitat improvement program. Habitat such as shrubby hedgerows that might be destroyed by the project can be readily replaced at the time of construction. Plantings for wildlife habitat improvement could be included in the resource conservation plans for each structure. See page 22, part II. The red-shouldered hawk is primarily a bird of the southeastern United States and is rare any distance from Lake Michigan. To the best of our knowledge, the specialized habitat occupied by redshoulders will not be effected by the impoundments.

(50) Comment: Environmental Impacts, page 62, paragraph 3. This entire generalized statement is to be stricken from the Final EIS, unless supporting justification or documentation is provided.

Response: Comment noted.

(51) Comment: Environmental Impacts, page 62, paragraph 8. What measures will be taken to reclaim vacated portions of roads and remove power lines to produce a more favorable landscape?

Response: Funds for reclaiming vacated portions of roads and power line relocations are included in land rights cost. Generally, abandoned roads will be reclaimed by removing the pavement and/or scarifying and revegetation. Abandoned poles will be removed.

(52) Comment: Environmental Impacts, page 62, paragraph 11. The EIS states that habitat for populations of muskrat, mink, and sparrow hawks will be reduced by construction of site 36. Other species will be affected by the impoundment and should be listed as affected or potentially affected.

Response: Comment noted.

(53) Comment: Alternatives, pages 65-69 (general comments). Only six of the eleven alternatives investigated by SCS in September 1975 are listed in the EIS "Alternatives" section. Also, we were unable to locate any economic discussion or documentation of Alternative 8 (large dam north of Richland Center). It would be of considerable value to have all pertinent economic data for each alternative (especially benefit and cost information) listed in a consistent and uniform way such as in a table. A discussion of where benefits are received and costs are incurred would also be useful.

Response: Some of the eleven alternatives were not physically feasible and others were entirely unacceptable to local people. The large dam north of Richland Center was investigated by the U.S. Army Corps of Engineers. As stated, the large dam exceeds SCS authority because of the storage capacity required. Displays similar to that suggested will be used under full implementation of principles and standards.

(54) Comment: Alternatives, page 67, paragraphs 4, 6, page 68, paragraph 1. Several negative references to the dike in Alternative 4 do not appear in the descriptions of Alternatives 5, 6, and 7 which also contain the dike. Uniform commentary would be beneficial to readers in assessing the various alternatives.

Response: The Alternatives section was intended to be read in an accumulative manner. The alternatives are developed in stages and similar material or detail is not repeated for the same components in subsequent alternatives.

(55) Comment: Irreversible and Irretrievable Commitments of Resources; page 73, paragraph 1. The loss of 328 acres of wetlands inundated by structures and wet sediment pools should have been included in the section on irreversible and irretrievable commitments of resources. The many valuable functions which wetlands provide should also be included.

Response: The direct impact of the project will be a net gain of wetlands. See the discussion on pages 58 and 59, part II.

(56) Comment: Irreversible and Irretrievable Commitments of Resources; page 73. Some unique land forms and vistas will be inundated by the planned structural measures, thereby affecting esthetic appeal. These obstructions of valley vistas and inundations of unique cliffs should be listed as irreversible and irretrievable commitments of resources.

Response: No known unique cliffs and/or land forms will be inundated by the planned structural measures. Obstruction of valley vistas by planned structures is included in the Adverse Impacts section, page 66, part II.

## Bibliography


(1) Bureau of Mines, The Mineral Industry of Wisconsin, 1971.

(2) Wisconsin Department of Business Development, Economic Profile, Richland and Vernon County 1970, Document Sales, Madison.

(3) Kienitz, Richard C., "Basic Kickapoo Plan Supported", Milwaukee Journal Newspaper, March 11, 1975, TV and Radio Programs Section, pages 3-4.

(4) McKee, Jack Edward and Harold W. Wolf, Water Quality Criteria, Publication 3-A, State Water Resources Control Board, April 1, 1971.

(5) Nee, Michael, Inventory of the Natural Areas of Richland County, Wisconsin, unpublished paper, University of Wisconsin, Department of Botany, September 23, 1970.

(6) Shaw, Samuel P., and Gordon C. Fredine, Wetlands of the United States, Circular 39, U.S. Department of the Interior, Fish and Wildlife Service, 1971.

(7) Scullin, Timothy J. and John R. Heaten, "Fish Inventories of the Pine River and Ash Creek, Richland County, Wisconsin", unpublished report, University of Wisconsin-Stevens Point, July 1974.

(8) State Historical Society of Wisconsin, Wisconsin's Historic Preservation Plan, Vol. II, The Inventory, Madison, Wisconsin, 1973.

(9) U.S. Bureau of the Census, U.S. Census of Population: 1970, Number of Inhabitants, Final Report PC (1)-A51 Wisconsin, U.S. Government Printing Office, Washington, D.C., 1971.

(10) Vernon and Richland Counties Soil and Water Conservation Districts, Pine River Watershed Work Plan, first draft, January 1970.

(11) Wisconsin Department of Natural Resources, Endangered Animals in Wisconsin, 1973.

(12) Wisconsin Department of Local Affairs and Development, Richland County Outdoor Recreation Plan, Department of Housing and Urban Development, 1974.

(13) Wisconsin Department of Natural Resources, Scientific Areas Preservation Council, Wisconsin Scientific Areas, Pub. 1-2800 (73).

(14) Wisconsin Department of Natural Resources, Wisconsin Trout Streams, Publication 6-3600 (74), 1974.

(15) Wisconsin Department of Natural Resources, Surface Water Resources of Richland County, Madison, Wisconsin, 1970.

(16) U.S. Department of Agriculture - Soil Conservation Service Watershed Protection Handbook, Washington, D.C.

(17) City of Richland Center, Ordinance No. 481, An Ordinance to Establish Flood Plain Management, September 1, 1970.

(18) U.S. Department of Labor, Manpower Administration, Area Trends in Unemployment and Underemployment, March 1975.

(19) Wisconsin Legislative Reference Bureau, State of Wisconsin Blue Book, Madison, Wisconsin, 1973.

(20) U.S. Department of Commerce, Weather Bureau, Climatological Summary, Madison, Wisconsin.

(21) The University of Wisconsin Water Resources Center, Some Effects of Hypolimnitic Discharges on Temperatures in the Stream Below, Technical Report (OWRR B-013-Wis.), Madison, Wisconsin, 1970.

(22) Wilhm, J.L., and Dorris, T.C., 1968. Biological parameters for water quality criteria: Bio-science, Vol. 18, p. 477-481.

## GENERAL REFERENCES

Hindall, S.M. and R.G. Borman, Water Resources of Wisconsin, Lower Wisconsin River Basin, U.S. Geological Survey, Hydrologic Investigations Atlas, HA-479, 1974.

Hindall, S.M., and R.F. Flint, Sediment Yields of Wisconsin Streams, Hydrologic Investigations Atlas, HA-376, U.S. Geological Survey, 1970.

Lorenzen, Robert M., "The Areal Geology and Stratigraphy of the Southeastern Quarter of the Richland Center Quadrangle", unpublished Masters Thesis, University of Wisconsin, 1952.

Students in Wildlife Ecology, 960-550-2, University of Wisconsin, Draft Environmental Impact Statement, Pine River Watershed, unpublished statement, April 1975.

U.S. Geological Survey and the University of Wisconsin Extension, Geological and Natural History Survey, Quality of Ground Water in Wisconsin, 1972.

U.S . Department of Agriculture, Soil Conservation Service
Administrative Services Handbook, Section 2000, 1974
Economic Guide for Watershed Protection and Flood Prevention
Engineering Field Manual for Conservation Practices, 1969.
National Engineering Handbook, Section 3, Sedimentation
National Engineering Handbook, Section 4, Hydrology
National Engineering Handbook, Section 5, Hydraulics
National Engineering Handbook, Section 6, Structural Design
National Engineering Handbook, Section 8, Engineering Geology
Technical Publication 61, Handbook of Channel Design for Soil and Water Conservation, 1954.
Technical Publication 149, A Method for Estimating Volume and Rate of Runoff in Small Watersheds, 1973
Washington Engineering Memorandum, 1-78
Washington Watershed Memorandum, 1-125
Washington Environmental Memorandum, 1-14
Washington Technical Releases, 1-40
Watershed Protection Handbook

U.S. Department of the Interior, Geological Survey, Water Resources Division, Unpublished Water Quality for Pine River Watershed, Special Study for the Soil Conservation Service, 1974.

U.S. Department of the Interior, National Park Service, National Register of Historical Places, Federal Register, Vol. 38, Nos. 39 and 107, 1973.

U.S. Water Resources Council, Agricultural Price Standards, Guideline 2, October 1974.

LIST OF APPENDICES



Approved by James [signature] State Conservationist

Date 5-27-76

# APPENDIX A

## Comparison of Benefits and Costs for Structural Measures

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Pine River Watershed, Wisconsin

(Dollars)

| Evaluation Unit | AVERAGE ANNUAL BENEFITS 1/ | | | | | Total | 2/ Average Annual Cost | Benefit Cost Ratio |
|---|---|---|---|---|---|---|---|---|
| | Damage Reduction | Changed Land Use Agr. | Recre-ation | Redevelop-ment Benefits | Second-ary | | | |
| 2, 7, 9, 11, 14, 21, 32, 33, 36 & Dikes and Recre-ational facilities at Site 2 and 36 | 472,200 | 14,200 | 321,400 | 41,800 | 82,200 | 931,800 | 732,600 | 1.3 |
| Project Administration | | | | | | | 74,000 | |
| TOTAL | 3/ 472,200 | 14,200 | 321,400 | 41,800 | 82,200 | 931,800 | 806,600 | 1.2 |

1/ Price base - current normalized prices for agricultural damages (WRC - October 1974); and current prices (1975) for nonagricultural damages.

2/ Includes operation, maintenance, replacement, and cost of structural measures amortized over a 100-year period @ 6-1/8 percent interest.

3/ In addition, it is estimated that conservation land treatment will provide flood damage benefits of $4,600.

MAY 1976

# APPENDIX B

## Letters of Comment Received on the Draft Environmental Impact Statement

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

April 22, 1976

Mr. J. C. Hytry
State Conservationist
Soil Conservation Service
Department of Agriculture
4601 Hammersley Road
Madison, Wisconsin 53711

Dear Mr. Hytry:

This is in reference to your draft environmental impact statement entitled "Pine River Watershed." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four (4) copies of the final statement.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure - Memo from Environmental Research Laboratories,
April 8, 1976

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Great Lakes Environmental Research Laboratory
2300 Washtenaw Avenue
Ann Arbor, Michigan 48104

April 8, 1976

APR 1 2 1976

TO : Director
Office of Ecology and Environmental Conservation, EE

FROM : Eugene J. Aubert
Director, GLERL

SUBJECT: DEIS 7603.05 - Pine River Watershed

The subject DEIS prepared by the Soil Conservation Service discusses the environmental effects of improvements in Pine River Watershed.

Improvements in Pine River include nine floodwater retarding structures. These structures will control the peak flows and reduce sediment supply to downstream reaches. For these reasons, the proposed improvements will have beneficial effects on discharges and water quality of the Wisconsin River.

No further comments are provided due to lack of expertise in environmental effects of soil conservation projects.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION V
300 SOUTH WACKER DRIVE
CHICAGO, ILLINOIS 60606

OFFICE OF
THE REGIONAL DIRECTOR

March 18, 1976

Mr. J. C. Hytry
State Conservationist
Department of Agriculture
4601 Hammersley Road
Madison, Wisconsin 53711

Dear Mr. Hytry:

RE: Draft Environmental Impact Statement
Pine River Watershed
Richland and Vernon Counties, Wisconsin

We have reviewed the Draft Environmental Impact Statement for the above project. To our knowledge, and based upon the information provided, this project will not impact to any significant degree on the health, education or welfare of the population.

Sincerely,

Robert A. Ford

Robert A. Ford
Regional Environmental Officer

cc: Charles Custard, OEA
Warren Muir, CEQ

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-76/186

APR 22 1976

Dear Mr. Hytry:

Thank you for the letter of February 23, 1976, requesting our views and comments on the draft watershed work plan and draft environmental statement for Pine River Watershed, Richland and Vernon Counties, Wisconsin. We have both general and specific comments arranged by section designation.

General Comments

This proposal involves the construction of a dike through Krouskop Park. The portion of this park on the northwest side of the Pine River was acquired with assistance from the Land and Water Conservation Fund (LWCF). Because the entire Krouskop Park is described in the LWCF project agreement, the entire park is subject to the provisions of Section 6(f) of the Land and Water Conservation Fund Act. Section 6(f) states in part that, "No property acquired or developed with assistance under this section shall, without the approval of the Secretary, be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location."

Telecommunications with Mr. J. P. Cavanaugh, River Basin Watershed Planning Staff, Soil Conservation Service, indicates that the proposed dike would traverse Krouskop Park between the river and the swimming pool. Engineering data are not available to determine whether the Allison Park Dike and the dike around the inholding in the Krouskop Park Addition would adversely impact on park land.

The final watershed plan and environmental statement should discuss the proposed dike in Krouskop Park. This discussion should include the dimensions of the dike, the existing uses of the park land on which the dike is to be constructed, the impacts of this dike on the park, plans for the future use of the park, and the effect of the dike on those plans, need for landscaping and fencing, and possible use of the dike for a trail.

The final document should also show evidence of consultation with the Wisconsin Department of Natural Resources concerning the effect of the proposed dike project on Krouskop Park and the bearing of Section 6(f) of the Land and Water Conservation Fund Act on the project.

## Watershed Plan

A major concern of our Fish and Wildlife Service (as expressed in their 1967 report and 1970 letter) was the anticipated destruction of trout habitat resulting from the development of Site 36 as a multiple purpose reservoir. Inasmuch that this concern has not been resolved satisfactorily, we suggest that you do not finalize the work plan until it documents that all trout stream losses would be compensated to the satisfaction of the Wisconsin Department of Natural Resources and the Fish and Wildlife Service.

To ensure that fish and wildlife resources are protected, we recommend that a separate agreement be entered into between the sponsoring local organization, Soil Conservation Service, Wisconsin Department of Natural Resources, and our Fish and Wildlife Service which outlines in detail the design features and operation and maintenance program for all structures. Provision for this agreement should be made a part of the watershed plan agreement before the work plan is finalized.

Paragraph 1, page 36, inaccurately portrays the condition of trout water in the watershed. High groundwater recharge of recent years is only one factor that has improved stream conditions for trout habitation. The trend toward purchase of small farms by absentee landowners for recreational purposes has resulted in fewer acres under cultivation and contributed to improved water quality. This trend shows no indication of reversal. Also, gravel spawning

beds are commonly located in riffle areas which experience a scouring and purging of sediment and organic debris during flooding. Deposition may occur in pools, but the evidence does not indicate poor trout survival. On the contrary, stream surveys indicate that trout survival and natural reproduction in these waters is excellent for southwestern Wisconsin.

Since stream environment will be altered at all impoundment sites as a result of sediment deposition, the miles of stream that would be lost at the four impoundment sites should be presented for accurate analysis (Selected Plan, Environmental Quality Account). Deposition of sediment in the streams above floodwater retarding structures (FRS) ultimately means an irreversible or irretrievable commitment of trout stream habitat.

The information presented on the recreation benefits to accrue to implementation of the plan is not adequate. It appears that the $321,400 benefit is applicable only to recreation uses at structures 2 and 36, and this was derived by assuming 142,800 visits at a unit day value of $2.25. There is no indication of the magnitude of fishing and hunting which would result from planned fish and wildlife improvement measures. There also is no indication of the amount of recreation that would be provided in the watershed under without-the-plan conditions. Consequently the net benefit of recreation use cannot be ascertained. The rationale for the assumed visits, the initial and ultimate use expected over the period of project analysis, and a justification for assigning the unit day value should be presented.

## Environmental Statement

### Planned Project

Page 17, Trout Stream Habitat Improvement. No date for the installation of instream devices was given. Such trout habitat improvement features should be installed prior to the construction of Site 21.

Page 18. It is unclear what agency or organization is to acquire replacement stream easements and railroad and trail easements. It is also unclear whether the replacement easements involve areas of equal recreational value.

Environmental Setting

Page 30, paragraph 3. We suggest that you present the benthic invertebrate collection data as an appendix so that the reader can draw his own conclusions concerning stream conditions.

Page 33, paragraph 8. The redside dace (Clinostomus elongatus), collected by Becker in 1963 in the Pine River, is now listed by Wisconsin as having watch status (Endangered Animals in Wisconsin, DNR, 1975).

Krouskop Park should be discussed including its physical description, type of facilities, and amount of use, page 35.

It is stated that recreational use of the streams is hindered for various reasons. The amount and kind of use that does occur should be described. Reference to the fishing and trail easements held by the DNR would be appropriate in this section. Reference to the study of the Wisconsin River as a potential addition to the National Wild and Scenic Rivers System would also be appropriate.

Areas which the Scientific Preservation Council believes have high priority for preservation are listed on page 38. It should be indicated whether any of these areas are affected by the watershed plan.

The most recent listing of the National Register of Historic Places shows that the A. D. German Warehouse in Richland Center, identified in this section of the EIS, was added to the National Register on December 31, 1974. The statement should be revised to indicate this fact and should note whether or not the proposed action would have an effect on this cultural resource. We also recommend that the State Historic Preservation Officer be consulted to determine whether the proposal would affect any other historic sites within the watershed that may be in the process of nomination to the National Register.

The Hub City Bog, identified in the first paragraph on page 36, has been evaluated by the National Park Service for listing on the National Registry of Natural Landmarks, but has not been found to be nationally significant.

Environmental Impacts

Page 54, paragraph 1. Deposition of sediment in the stream channel occurs in pools in lower reaches of the watershed where floodwater velocity is reduced. Deposition also might be expected above flood water retarding structures within the limits of the sediment pool.

Stream riffles are scoured and purged of silt and organic debris during flooding. Structural works may reduce sediment deposition in pools of the lower reaches of the watershed, but an increase in deposition could result above structures and possibly in riffle areas below structures which are no longer subjected to periodic high velocity waters. Also, the instream devices to be installed below Site 21 on Melancthon Creek would enhance the trout fishery only if cover is presently a limiting factor.

Page 54, paragraph 2. The possibility of hydrogen sulfide and ammonia in the bottom release water and associated adverse effects on the downstream fishery should be discussed. Aeration capabilities should be included in the design of Structures 2 and 36.

Page 54, paragraph 3. The quality of the fishery at Multiple Purpose Structure 36 would vary directly with the management effort. Costly management techniques such as stocking of large predators, water drawdown for rough fish control, and control of aquatic vegetation are just a few of the measures which might be required to maintain a high quality warmwater fishery.

Wet sediment pools at Sites 7 and 32 may have limited potential for a put and take seasonal fishery for the first few years, but thereafter, as water depths increase, fishery values would be lost. The statement should discuss declining fishery values which will take place at Multiple Purpose Structure 36 and Sites 7 and 32.

According to the table on page 58, the plan would affect more than nine miles of free flowing streams in sediment pools and seven miles of free flowing streams in retarding pools. This should be discussed. The loss of any stream

related recreation which would occur should also be discussed. Any loss in recreation associated with the free flowing stream should be subtracted from the recreational benefits claimed for the reservoirs.

The impacts of the proposal on the Wisconsin River should be discussed.

The environmental statement should include an evaluation of the effects of the impoundments on ground-water levels and quality.

Page 62, paragraph 1. As the wet sediment pools fill in, recreational opportunities for fishermen will decrease to zero at some time during the 100-year project life. This concept should be recognized in the statement.

Adverse Environmental Effects

Page 63, paragraph 1. Structure 32 should be added to the list of those which may adversely affect trout waters. Adverse effects also should include a description of the loss of trout-stream-based recreation. Approximately 2300 feet of trout stream will be replaced by pipe through the structures. Losses of trout stream habitat would increase throughout the project life as sediment deposition occurs above the structures.

Irreversible and Irretrievable Commitments of Resources

Page 73. The loss of stream habitat above flood water retarding structures (FRS) will increase throughout the life of the project. All streams, except that on which FRS 9 will be constructed, are trout streams, and the loss of the valuable habitat is significant. This loss should be recognized as an irreversible and irretrievable commitment.

The statement is made that the sponsoring local organization is responsible for obtaining all necessary permits (page 19, EIS). Several of the structures may require a Federal permit under Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Inquiries should be directed to the District Engineer, St. Paul, Minnesota 55101.

We hope these comments will be of assistance to you in the preparation of the final statement.

Sincerely yours,

Stanley D. Doremus

Deputy Assistant Secretary of the Interior

Mr. J. C. Hytry
State Conservationist
Soil Conservation Service
Department of Agriculture
4601 Hammersley Road
Madison, Wisconsin 53711

**DEPARTMENT OF TRANSPORTATION**
**UNITED STATES COAST GUARD**

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

19 APR 1976

Mr. J. C. Hytry
State Conservationist
Soil Conservation Service
4601 Hammersley Road
Madison, Wisconsin 53711

Dear Mr. Hytry:

This is in response to your letter of 23 February 1976 addressed to the Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Pine River watershed, Richland and Vernon Counties, Wisconsin.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

**D. J. RILEY**
**Captain, U. S. Coast Guard**
**Acting Chief, Office of [illegible]**
**Environment and Sys[illegible]**

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

RE: 76-012-936
D-SCS-F36033-WI

Mr. J. C. Hytry
State Conservationist
U.S. Soil Conservation Service
4601 Hammersley Road
Madison, Wisconsin 53711

Dear Mr. Hytry:

In response to your letter of February 23, 1976, we have reviewed the Draft Environmental Impact Statement (EIS) and the Draft Work Plan for the Pine River Watershed Project located in Richland and Vernon Counties, Wisconsin. Based on the information contained in the EIS and our participation at the September 10, 1975 tour of the watershed with your staff and other interested agencies, we have no objections to the project. However, we have some comments concerning the adequacy of the EIS. We offer the following comments for your use in preparing the Final EIS.

According to the Draft Plan on page 2 paragraph 6, "The Wisconsin Department of Natural Resources (DNR) will furnish funds for trout stream habitat improvement and may provide funds for recreational developments". If funds are not provided by the Wisconsin DNR, the effect on the scope of development should be addressed.

The EIS should explain in more detail how agricultural waste management systems will be planned to contain and manage liquid and solid wastes, including runoff from concentrated waste areas. Also, the effects of these measures on soil, air, and water should be discussed.

The EIS should acknowledge the new sewage treatment plant serving Richland Center. This plant is protected to 735 feet (mean sea level) which is 2 feet above the level of the 100 year flood. A discussion of the effects, if any, of the proposed dike works at Richland Center on the operation of this plant should be described.

The recreational use projections for this project are predicated on the completion of LaFarge Reservoir, for which funding is presently suspended for environmental reasons. The EIS should discuss impacts on the Pine River Watershed project if the LaFarge Reservoir is not completed as originally designed.

The listing of the point sources of pollution should include the Richland Center Foundry Company, the Richland County Senior Citizens Home and the Yuba Cheese Factory, which is located upstream from a muliple purpose structure and could adversely effect water quality.

It is proposed to use cold water from the bottoms of the two multiple purpose reservoirs to reduce temperatures in the Pine River during summer months. Although water from the bottoms of the reservoirs should have a lower temperature, dissolved oxygen could be critically low. Measures should be taken to assure no degradation of water quality in the stream below those reservoirs.

A dry dam is proposed at site 21 on Melancthon Creek, which has been described as the best trout water in Richland County. Migration features are to be installed to aid spawning fish. The EIS should describe the effectiveness of the migration features and discuss the effects of flood water retention on the spawning beds.

Private development could occur near the recreation sites and adversely effect water quality. State and local regulations to prevent water quality degradation should be described.

The water quality generally will be adequate to support use for water contact recreation and cold water fishery. The reduction of sediment and the control of liquid and solid agricultural wastes proposed by the project will result in water quality improvements.

We have classified our comments as Category LO-2. Specifically, this means we have no objections to the project; however, we believe additional information should be provided in the EIS to further evaluate the environmental impacts of the project. This classification and the date of our comments will appear in the Federal Register.

Thank you for providing us with an opportunity to review and comment on this project. Please provide us with two copies of the Final EIS at the same time it is filed with the Council on Environmental Quality.

Sincerely yours,

Gary A. Williams

Gary A. Williams
Chief,
Environmental Review Section

STATE OF WISCONSIN
BOARD OF
SOIL AND WATER CONSERVATION DISTRICTS

1815 UNIVERSITY AVENUE
MADISON, WISCONSIN 53706
TEL. (608) 262-2634

May 19, 1976



Mr. Gerald Hytry, State Conservationist
U.S.D.A - Soil Conservation Service
4601 Hammersley Road
Madison, Wi 53711

Dear Mr. Hytry:

The Board of Soil and Water Conservation Districts, having responsibility for approving and coordinating the participation of soil and water conservation districts in P.L. 566 watershed projects, hereby takes note of the Preliminary Draft Work Plan and Environmental Impact Statement, Pine River Watershed, Richland and Vernon Counties, and submits the following comments:

We concur in the project planned measures as described in the above documents and as adopted by the project's local sponsor, the Richland and Vernon County Soil and Water Conservation Districts. We note that the Pine River Watershed Associations received approval for planning assistance in 1961, fifteen years ago. The local sponsors have sustained the spark of community interest through many periods of disappointment and frustration, and we earnestly hope this plan can now be promptly carried through to completion.

We also note, with concern, the reported tendency of the zoning authorities of Richland Center to grant variances to the city's flood plain zoning ordinances. The Board feels that the purpose of such ordinances is to protect private and public interests from flood damages, and that they must be strictly administered to be effective.

We urge that the Richland and Vernon County Soil and Water Conservation Districts strive by all available means to exceed the goals of the plan with respect to land treatment for erosion and sediment control, in order to prolong the useful life of the water impoundments and maintain the highest possible water quality throughout the river system. The possibility of obtaining conservation cost-sharing funds through local or state appropriations should be considered.

Mr. Gerald Hytry
May 19, 1976
PAGE II

Finally, a passing comment on the biological reconnaissance team report, dated 7/20/72 - - the fishing easements mentioned on page 6 (Recommendation 3) are owned by the State of Wisconsin, not by the Department of Natural Resources.

We thank you for the opportunity to review these documents, and are pleased to cooperate with districts and assisting agencies in beneficial, environmentally sound projects.

Sincerely,

Eugene Savage
Executive Secretary

Leonard Johnson
Environmental Impact Statement Representative

ES/LJ/sv

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl
Secretary

BOX 450
MADISON, WISCONSIN 53701

May 5, 1976

IN REPLY REFER TO: 1600

Mr. Jerome Hytry
State Conservationist
Soil Conservation Service
Box 4248
Madison, Wisconsin 53711

Dear Mr. Hytry:

Re: Draft Plan and Environmental Impact Statement Pine River Watershed, PL-566

The following specific comments are in addition to our general comments on the preliminary draft submitted October 9, 1975. We request that the concerns expressed in both reviews be considered in the final EIS.

Agreement

AGR-2 -- The sponsoring local organization may be eligible to receive 50 percent financial assistance through PL-566 for the acquisition of land rights necessary for the trout stream improvement project. The project proposes to acquire 6,160 feet of stream on Melancthon Creek to replace public easements on the Pine River and to undertake 4.5 miles of stream habitat improvement which will require additional easements. Federal cost-sharing assistance in acquiring these land rights would greatly strengthen this aspect of the plan.

AGR-4, Item 7 -- There should be a contingency provision in the agreement assuring PL-566 cost sharing assistance for land treatment measures in the event that other federal assistance programs to landowners are not available or are inadequate to accomplish the needed land treatment measures projected in the plan. This might strengthen the role of land treatment in PL-566 projects.

Watershed Plan

Page 1, paragraph 1 -- This statement would be consistent with similar statements if fish and wildlife improvement was added to the list of objectives.

Page 11, paragraph 4 -- The term "flood plain grouting" is confusing. Could it be either flood plain routing or foundation grouting?

Page 15, paragraph 2 -- Reducing the sediment load in the Richland Center Mill Pond to less than three-fourths of the present rate has no apparent monetary value such as the projected $10,200 in annual benefits. The basin may be very close to its sediment equilibrium capacity. In paragraph 2, page 26 EIS it is stated that sediment deposition has greatly decreased its existing value. If dredging were planned, the case might be different, but this action is not proposed.

Page 15, paragraph 6 -- The $14,200 of annual benefits attributed to the conversion of 295 acres from pasture to cropland seems to assume that the hazard of flooding is the only deterrent to this conversion. Other factors, such as normal high groundwater conditions; proximity of the fields to the streams and the attendant erosion hazard, reluctance to pasture woodlots and steep slopes to compensate for lost pasturage, and dependence on off-farm employment may restrain the intended conversion.

Page 15, paragraph 7 -- An unanticipated reduction in recreational use could seriously affect Richland County's ability to finance operation and maintenance of the recreation facilities. This is estimated to be $80,000 annually. Therefore, a brief discussion of the substantiating data from the SCS 1975 survey, its correlation to the selection of a "foundation" lake, and the methodology used for the comparative analysis would be very helpful in establishing confidence for the benefits proposed.

Page 29, paragraph 6 & 7 -- This explanation does not demonstrate the financial capability of the sponsor to carry out the project. Your letter of March 23, 1976, in response to our general comments on the preliminary draft offered some pertinent information on this subject that should be included in this Draft Statement. This type of economic analysis is essential in order to assure that the service as well as the sponsor is not proceeding with a selected plan that is impractical in terms of local financial capability.

Table I -- The accelerated land treatment program calls for an expenditure of about $500,000 for diversion and floodwater retarding structures on forest land installed under the supervision of the SCS. It would seem appropriate in the section on the Planned Project to elaborate on the number and relative size of these structural measures; to show in the section on Problems the need for placing these on forest lands as opposed to crop or pasture lands and; to describe in the Environmental Impacts section the effect of these developments on the forest resource in terms of the amount of forest area disturbed and the possible effects of sedimentation on headwater streams as a result of the initial construction.

Other -- It should be noted in the work plan that as a matter of state policy No. PL-566 structural measures can be built until the requirements of Wisconsin Administrative Codes NR 115 and NR 116 regarding flood plain and shoreland zoning are met. At such time that the watershed works of improvement are installed and operative, the affected governmental units may reduce their protection levels accordingly.

Environmental Impact Statement

Page 1, V -- The reference to "incidental recreation" in connection with the two multiple purpose lakes is a misleading summarization. Over three million dollars or about 70 percent of the total cost of these structures can be attributed to recreational purposes.

In addition to the 436 acres of cropland removed from production as mentioned, another 404 acres should also be removed from the retarding pools or risk induced flooding.

According to this summary 18.2 miles of stream are affected by the structures, but the Impact Summary Chart indicates 17.2 miles affected.

Page 17, paragraph 9 -- The implication that new trout spawning areas will be created in Melancthon Creek by artificial techniques should be discounted. In Wisconsin streams this is a very marginal proposition. The existing natural trout reproduction in this stream will continue to be dependent on the natural spawning areas located near the site of the proposed dry sediment pool. If the dam hampers trout migration upstream, obliterates spawning areas in the sediment pool or permanently consolidates sediment in downstream reaches we would expect natural reproduction to be reduced accordingly.

Page 33, paragraphs 4, 5, 6, 7 -- The description of the fishery resources of the Pine River Watershed is not adequate. The lead paragraph combines streams and oxbow lakes in a simplistic description of the warmwater fishery and further generalizes that this description is the standard of the fishery in the county. There is no distinction or significance given to the abundance of coldwater streams or coldwater fish species throughout the upper watersheds of the county. The next three paragraphs deal with two site specific stream surveys that have little relevance to the fishery resource being described. Subsequent paragraphs reference numerous WDNR stream surveys but the presentation fails to use this information to develop a clear perspective of the coldwater fishery in the watershed.

Page 46, paragraph 4 -- The project proposes a substantial investment of federal and local funds to satisfy recreational needs. However, no specific demand/needs data are offered to support the estimates of expected use or to substantiate the generalization that water-based recreational facilities at the Wisconsin River, Blackhawk Lake, Plain Honey 3 or West Fork of the Kickapoo are presently overtaxed.

Paragraph 6 -- In addition to the improved stream flow as a result of higher precipitation, it can be observed that groundwater discharge has also benefitted from a reduction of intensive agricultural activities in areas occupied by absentee landowners. It is anticipated that this ownership trend will continue and along with the accelerated land treatment program should further stabilize springflow and sustain an improved trout fishery indefinitely.

Page 53, paragraph 4 -- Assuming 295 acres of flood-vulnerable pasture lands are converted to cropland as proposed, there is no practical reason to expect that this change would result in better resource management. The likely adverse impacts of this conversion include increased soil disturbing activities near streams and attendant erosion, increased wetland drainage, and more intensive pasturing of woodlands and grasslands on steep slopes. Also with the continued interest in cash cropping, there is little basis for the proposition that the steeper upland fields will be retired from cultivation in the readjustment process.

Page 54, paragraph 5 -- In regard to the "moderating" influence of the two multiple-purpose sites on upstream water effecting downstream water quality, we suggest that increased ammonia toxicity and BOD stress may be particularly important moderating possibilities.

Specific water quality data developed from the comparisons made with the other man-made impoundments should be presented. The particular measurements of the "similar parameters above and below" the comparable impoundments would give a degree of substance to these investigations.

Page 54, paragraph 6 -- The conculsion that the multiple-purpose impoundments will result in a good quality resource desirable for water contact sports and supportive of a good lake fishery is an important finding. The validity of this prediction, however, rests not only in attaining but in sustaining the proposed benefits over the amortization period of the investment. Considering the general progressive obsolence of impoundments located in agricultural watersheds and the additional risk of accelerated obsolence of special benefits such as water contact sports and fishing as forwarned by known water quality parameters, it can be assumed that some benefits may expire sooner than the 100-year design life of the impoundment. The ultimate decision to build must be based at least in part on a realistic understanding of the useful life period of the recreational benefits and the degree of socioeconomic disruption, if any, that can be anticipated when these benefits permanently cease.

Page 55, paragraph 5 -- No impacts are described for the proposed relocation of State Highway 80 over County Highway C through the Melancthon Creek valley. The stream is immediately adjacent to the present road for a distance of 6 miles and the two intersect at seven locations. The stream and trout fishery could suffer significant harm from channel work and sedimentation during reconstruction of this road.

Paragraph 7 -- The impact of the structural measures on perennial streams should be discussed in a more logical and comprehensive manner. The reference to "7.2 miles of approximately 200 miles of perennial stream in the watershed will be inundated by a 100-year flood event" is apparently an attempted explanation of the impact of the retarding pools on perennial streams. One could also interpret the statement to mean that 192.8 miles of stream in the watershed will receive such protection that they will not exceed bank-full levels even during the 100-year flood event! Additional references to stream modification indicated on page 54 paragraph 2, 3 and 5, page 57 paragraph 3 and 7, page 59 paragraph 1, 2 and 4 deal mainly with enhancement features and project justification rather than the impacts on the ecology of natural perennial streams and trout fishery.

Dam sites numbers 21, 11 and 33, as presently located, would destroy significant trout habitat. In the case of number 21 on Melancthon Creek, it is also anticipated that gravel deposits within the flood pool that are vital for brook trout reproduction would be buried in sediment.

On page 62 paragraph 10, there is a second but more accurate reference to the "7.2 miles of perennial stream," and on Page 63 paragraph 1, a vague reference to adverse effects on trout water. In summary, all the references cited do not add up to an adequate effort to describe and quantify the important impacts associated with the total 17.2 miles of perennial streams directly effected by the dams. In addition, there are unaddressed, secondary impacts to consider having to do with the reduced resource base available for the pursuit of trout fishing recreation, and the introduction of warm water fish species and their distribution potential from impoundments into connected trout waters and the resulting predation on young trout.

Page 61, paragraph 1 -- The reference to 100 percent reduction of floodwater damage to Richland Center should be qualified by the phrase <u>caused by the Pine River</u>.

Page 62 -- For additional clarification, an explanation is required on the impact on the forest resource in the watershed resulting from a proposed expenditure of about $500,000 for diversions and floodwater retarding structures on these lands and the relationship between the objective of this effort and the objectives of the forestry program for cattle exclusion and tree and shrub planting.

Page 63 -- The following additional impacts are reasonably apparent and should be stated:

1. The secondary impact of private recreational development, as prompted by the establishment of the recreational lake at Site 36. For instance, its effect on the rate of conversion of cropland to recreational use and the likely effect on property tax payments required by local farmers as a result of accelerated land prices.

2. Drowning is an ever-present risk of lake use, and is probably even more relevant in this context than in regard to flood events in this watershed.

Page 71 -- Short-Term vs. Long-Term Use of Resources. In a previous comment directed to page 54 paragraph 6, we posed the question about the useful life of the recreational lakes for serving the intended purposes of active water-based recreational activities and recreational fishing. This section should squarely face the prospect of progressive lake eutrophication and appraise, at least in general terms, the possible need and probable cost of such intermediate and costly management techniques as lake aeration, fish stocking, water drawdown, rough fish control and aquatic vegetation control. These operations go beyond normal maintenance, but they are so often necessary in order to maintain the recreational benefits of artificial lakes even over the short-term.

Page 73 -- Irreversible & Irretrievable Commitments of Resources. We recommend that this section described the irreversible losses of natural stream. Significant reaches of natural stream would be directly lost or greatly changed by structural works and the amounts can easily be quantified. While the project proposes some stream enhancement features and incorporates the replacement of certain existing public stream easements, we see no logic for the omission of the irreversible losses concerning this resource.

The taking of cropland for irreversible noncrop uses has become increasingly indefensible. It should be described in clear terms that about 840 acres of cropland are so committted in this proposal.

We appreciate this opportunity to review the Work Plan and Draft EIS. Feel free to contact us if you have any questions about our comments.

Sincerely,
Bureau of Environmental Impact

C. D. Besadny (mr)

C. D. Besadny
Director

Advisory Council
On Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

April 13, 1976

Mr. J. C. Hytry
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
4601 Hammersley Road
Madison, Wisconsin 53711

Dear Mr. Hytry:

Thank you for your request of February 23, 1976 for comments on the environmental statement for the Pine River watershed, Wisconsin. Pursuant to our responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969 and the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), we have determined that:

Your draft environmental statement appears adequate concerning our area of interest, and we have no comments to make at this time.

Should you have any questions on these comments or require any additional assistance, please contact Charles Spilker of the Advisory Council staff 202-254-3380.

Sincerely yours,

John D. McDermott
Director, Office of Review
and Compliance

*The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.*

**DEPARTMENT OF WILDLIFE ECOLOGY**

226 Russell Laboratories    University of Wisconsin - Madison    53706
COLLEGE OF AGRICULTURAL AND LIFE SCIENCES SCHOOL OF NATURAL RESOURCES

April 29, 1976

Mr. J. C. Hytry
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 4248
Madison, Wisconsin 53711

Dear Mr. Hytry:

The attached comments pertain to the Draft Environmental Impact Statement for proposed works of improvement on the Pine River Watershed in Richland and Vernon Counties, Wisconsin. These were prepared by students enrolled in the course, Wildlife Ecology 550 - Environmental Impact Assessment, at the University of Wisconsin-Madison. Each comment is referenced according to major heading, page and paragraph of the draft statement.

Prior to the actual preparation of review comments, students visited the project site, attended local watershed meetings, researched the history of watershed projects in the state, and met with personnel of various state and federal agencies having planning responsibilities under the PL-566 program in Wisconsin. Furthermore, we have scheduled a meeting for May 14, with your River Basin and Watershed Planning staff to review the attached comments. We anticipate that such a review will result in the clarification of specific comments to our mutual satisfaction, and thereby facilitate any obligatory written responses by the Soil Conservation Service in the Final Environmental Impact Statement.

In submitting these comments on behalf of the students, I wish to acknowledge the splendid cooperation displayed by your staff during all phases of our review process. The complexity of the proposed project in the Pine River watershed merits such a cooperative venture, and I believe all interested parties benefited from the exchange of information and ideas.

Sincerely,

Robert L. Ruff

Robert L. Ruff
Associate Professor

RLR:ks

STUDENT SIGNATURE BLOCK

Charles Ballweg
Wildlife Ecology

Thomas Blackwood
Recreation Resources Management

Melissa Carpenter
Landscape Architecture

Robert Engelke
Institute for Environmental Studies

Timothy Hansen
Landscape Architecture

Carolyn Heller
Water Resources Management

Craig Johnson
Landscape Architecture

David Kendziorski
Water Resources Management

Gregory Lunkes
Agricultural Economics

Linda Marek
Water Resources Management

Thomas Molinaro
Bacteriology

Randy Rodgers
Wildlife Ecology

Sukhoom Rowchai
Water Resources Management

Corrine Scofield
Botany

Timothy Spruill
Water Resources Management

Nels Swenson
Wildlife Ecology

Robert Walters
Water Resources Management

Paul Zeldin
Zoology

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PINE RIVER WATERSHED (PL-566) IN RICHLAND AND VERNON COUNTIES, WISCONSIN
by
Students enrolled in the course Wildlife Ecology 550 at the University of Wisconsin, Madison; Robert L. Ruff, Professor.

A. PART I - DRAFT PLAN: Principles and Standards Phase - In Addendum; Selected Plan, Social Well-Being, p. 45(f) - (Section A) Only benefits have been included. Negative aspects should be included such as reduced real income due to increased taxes, reimbursement costs, and other adverse economic effects. (Section B) This section should also include such threats to life, health, and safety as; increased vector breeding sites, decreased safety due to increased traffic, increased noise and air pollution from autos.

B. PART II - DRAFT ENVIRONMENTAL IMPACT STATEMENT.

1. Summary Sheet; Part IV, Description of Project Purpose and Action; page 1. It is stated that the primary objective of this project is watershed protection, and that this objective will be achieved through the application of land treatment practices supplemented by floodwater retarding structures. Yet, only 31 per cent of the planned project expenditures are committed to land treatment (includes ongoing program), while 65 per cent is designated for flood control (Table 1). Structural measures do little to prevent erosion on that land which is not part of the floodplain below structures (94%). Structures reduce sediment after, and only after, it has been carried off the land and into a watercourse. It is therefore seems improper to suggest that erosion control is the primary objective. Furthermore, it is stated previously, (Summary of Plan, Watershed Plan; page 1, paragraph 5) that "frequent and severe flooding of valley bottomlands is the principal problem in the Pine River Watershed.

   Consequently, the following reordering of stated priorities would be more appropriate: (1) flood prevention, supplemented by (2) watershed protection, (3) recreational development, and (4) fish and wildlife improvement.

2. Project Purposes and Goals, page 7-8 (general comment). Enhancement of the watershed environment should be expressed as one of the basic objectives of this project. This enhancement implies the presence of aesthetic appeal which may be defined as: the perception of various environmental features as they relate to a sense of beauty, human interest, visual harmony, or level of experience. The aesthetic appeal of a natural environment is based on its existing character, uniqueness, and diversity. Any project purpose leading to the addition or loss of these elements should be specifically addressed in the EIS.

3. Project Purposes and Goals, page 8, paragraph 4 - The Wisconsin Outdoor Recreation Plan of 1972, when describing the overall needs for Region 3, states the following:

> Although there are scattered facility deficiencies in several of the region's communities, the main areas of concern is resources protection and enhancement. The driftless area topography combined with the Mississippi and Wisconsin Rivers are invaluable resources. Retaining the scenic splendor of the coulees, bluffs and ridges and preserving the atmosphere of this unique area are the priority objectives for Region 3.

If, in fact, the recreational facilities of sites 2 and 36 are necessary to fulfill the needs of the region, how is their implementation consistent with the spirit of the regional plan?

4. Planned Project, pages 9-12 (general comment). The discussions of the land treatment and structural measures which will significantly affect the visual character of the Pine River watershed are very general and do not contain references directly relating to their use in the watershed. Specific descriptions, including photographs, would be helpful in determining their overall appearance and application in the watershed.

5. Planned Project, page 9, paragraph 6. Livestock exclusion from woodlots is one measure of land treatment to be applied. Part of the purpose of this practice is to improve the quality and quantity of the plant and animal resources in the watershed (see page 11, paragraph 1). We generally concur and the latter has been well documented.

   However, it is later stated that only 18 per cent of the livestock exclusion designated as needed under current conservation plans has been installed (page 37, paragraph 5). This is the lowest installation level of any of the seven land treatment categories mentioned.

   In that the potential benefits to plants and wildlife through livestock exclusion are substantial, some explanation is needed as to why this phase of land treatment has been given so little attention in the past. Furthermore, what assurances are there that cooperation under the accelerated program will be any better than the rather poorlevel obtained under the ongoing land treatment program?

6. Planned Project; pages 9 and 11. In that "weeding" and "timber stand improvement" imply removal of vegetation which competes with commercially valuable timber, these practices will reduce food, cover, diversity, and, therefore, wildlife in the community. What wildlife considerations will be incorporated into these practices?

7. Planned Project, page 10, paragraph 4. The impact statement does not indicate what types of plants are to be used in critical area plantings. Native species could contribute much to preservation and enhancement of the character of the watershed environment. Consideration should be given to the development and use of native species for critical area planting.

8. Planned Project; page 13, paragraph 3. The size of the structural measures indicates that they will have a very significant effect on the existing landforms of the region by interrupting the valley vistas and inundating rock outcroppings. There is no evidence in the impact statement indicating that aesthetic effects of structural measures were considered in their site selection and design. The EIS states that ". . . structural works were selected based on physical site location or feasibility." What were the specific criteria used in these decisions?

9. Planned Project; page 15, paragraph 5. It is difficult to concede that the impoundments at sites 2 & 36 will indeed be designed to preserve and improve the existing fish resources. According to the EIS on page 54, paragraph 5, the Environmental Impacts section, "Predicted changes under future impoundment conditions are at best speculative". Since changes will occur (although the magnitude and specific nature of these changes is unknown), preservation and improvement of the existing fish resources is not possible.

10. Planned Project; page 15, paragraph 9 and page 16, paragraph 8. (a) The importance of an environmental buffer beyond the PL-566 cost-sharing boundary should be emphasized in the EIS. Residential and second home development in the immediate impoundment area would not only serve to lessen the viability of the nature conservancy and its benefits, but also clash with the visual experience of many recreational users, especially hikers and campers. The EIS states that Richland County "intends" to purchase additional acreage for an environmental buffer and possible future expansion. What assurance is there that this purchase will be made? (b) In light of the tentative nature of the land purchases, the conceptual plans for sites 2 and 36 should be altered so as to clearly indicate that the park boundaries could be less than that shown. Likewise, it should be made clear that certain activities could occur precariously close to private residences, i.e., the walk-in campsites at site 36 may be unsuitable if such development should occur. The plan should also provide a key to vegetation type, slope, etc., to clearly indicate how the various activities and facilities will interact with the environmental setting. For example, it should be noted whether campsite and trail settings are open or wooded, and whether or not they intrude on fragile plant communities. How well do the conceptual plans for sites 2

and 36 provide for aesthetically pleasing experiences for a wide range of users? (c) The establishment of a nature conservancy is surely an asset to any area that has one. However, the viability of a true conservancy must be addressed in terms of the ecological integrity of the activities that take place there. If, in fact, the future should hold the possibility of snowmobiles and trail bikes in these areas, their effect on ecological balance as well as the experience levels of the other users must be considered. Since the motorized users would tend to dominate in this situation, the EIS should be very specific in its plans for the areas. That is, if the plan calls for a nature conservancy, any plans for trail bikes and snowmobiles must be scrutinized or ommitted. In addition, the type of boaters that use the impoundments could determine the character of the area. Site 2, for example, appears to be much too small for power boat activity, yet this subject was not addressed. What consideration has been given to the ecologic-aesthetic effects of motorized recreation in the areas?

11. Planned Project; page 14, paragraph 6. The procedure for identifying borrow sites and obtaining borrow for the structures should be discussed more thoroughly. The topography, vegetation and wildlife of these areas will surely be affected. These effects should be documented. If cropland is used for the borrow, and then planted to grassland or wildlife habitat, this loss of cropland should be included as a cost of the project. If other lands are used, a discussion of both short-term and long-term effects is needed.

The locations of borrow sites are not mentioned. Such locations and attendant impacts of development should be supplied in the Final EIS.

12. Planned Project; pages 18-22 (general comments). A considerable amount of optimism is evident throughout the EIS regarding the anticipated development of a warm water-fishery at sites 2 and 36. The potential quality of the water and the fisheries at the impoundments are dependent on three factors: 1) Site selection, (2) method of construction and 3) future management plans. In the driftless region of Wisconsin, impoundments have been historically shortlived and of marginal quality when not supported by a sound management plan.

The EIS does not mention any plans for the establishment of game fish nor how such fisheries would be managed. Despite speculation as to predicted changes in water quality under impoundment conditions (page 54, paragraph 5) and little assessment in the way of game fish habitat requirements, the statement again reflects much optimism that impoundments will

'naturally' create a warm-water fishery. Such optimism is justified only when it has been demonstrated that game fish will benefit directly from water impoundment and become established at harvestable levels. In view of these considerations the statement should address more specifically what management provisions are to be considered and how they would be implemented.

A number of measures are available for the improvement of the impounded water. Some of those proposed by the IES Center for Biotic Systems (IES Report #28) are:

1) Preceeding reservoir construction, all woody vegetation should be removed. The area should then be burned twice, once during the year prior to filling and again shortly before filling. Using simulated lakes, the IES found nutrients released to the water from vegetational debris was significantly decreased.

2) Possibly preshaping the impoundment bottom to encourage marsh vegetation. Resultant macrophytes would provide waterfowl habitat, a trap for nutrients, and eliminate some sediment problems if located at the mouth of the river entering the impoundment.

3) Incorporate measures for hypolimnetic aeration which would preserve thermal stratification, maintain oxygen in the bottom waters for improved fish habitat, and improve conditions of the river downstream. In addition, plans should be implemented which would prevent the upstream migration of undesirable fish species into the impoundments, and provide adequate breeding sites and cover for desirable species.

13. Planned Project; page 22, paragraph 2. (a) Construction of this project could ultimately remove 4,817 acres from the tax base of Richland County. An estimation of the average loss of revenue should be made and included in the EIS. (b) An estimation should be made of the mil-rate increase in property taxes to Richland County landowners which will be necessary to finance the project.

14. Environment Setting; page 24, paragraph 5. It is stated that "No (geologic) faults were seen during the field reconaissance" implying none were present, nor was there any mention of jointing in the rocks. Several large joints are present at the vicinity of site #36 (T11N, R1-2E, Sec 27-28). Their significance is:

1) Water which collects in the fractures during the winter will freeze and expand. This could cause damages in upland parking lots or personal facilities created for the recreation site. Such damages would add to construction and maintenance costs

2) Water will travel through these fractures directly into the lake without first being purified by traveling through the soil or sandstone.

Consideration should be given to the foregoing in the final EIS.

15. <u>Environmental Setting; page 27, paragraph 6 and page 28, paragraph 1</u>. What is the minimum total phosphorus content? Is it 0.00 to 0.03 (page 27) or is it 0.06 to 0.10 (page 28)? Also if maximum values occurred during periods of surface runoff and total phosphorus concentrations under base flow conditions were higher than those in the headwaters, then why "during periods of surface runoff values obtained were comparable to those observed at the headwater sites."?

16. <u>Environmental Setting; page 29, paragraph 2</u>. Due to agitation and greater surface contact of water in streams, the dissolved oxygen (DO) concentrations are inadequate to provide an idea of the DO concentration when such waters are impounded. The use of the Biological Oxygen Demand (BOD) would provide a better idea of the DO of such waters when impounded. The BOD should have been included in the testing.

17. <u>Environmental Setting; page 29, paragraph 4</u>. The Committee on Water Quality for the U.S. Secretary of the Interior has determined that water for primary contact recreation should not have a fecal coliform count exceeding a log mean of 200/0.1L with not more than 10% of the sampling exceeding 400/0.1L. Wisconsin statutes have identical requirements for water quality. In view of the foregoing, what justification can be given for the establishment of recreational water (including swimming) in the Pine River watershed which already has values, as stated in the EIS, which greatly exceed the above mentioned limits?

In addition, the planners for the project anticipate that stream self-purification or retention ponds will remove harmful organisms from the water, additional documentation is needed. More specifically, unless the coliform count is reduced to acceptable levels in time periods less than the literature values for survival of the bacteria of 2 to 7 days, a potential health hazard will exist. Hence consideration should be given to what effects this may have on the B/C ratio because of the recreational benefits that may be foregone. Included in this should be the amount of recreational benefits lost that are attributable to swimming and the amount of other types of recreational benefits lost because of the stigma associated with the use of facilities near polluted water.

18. Environmental Setting; page 29, paragraph 4. Samonella, Leptospirosis, and Mycobacterium tuberculosus are commonly found in cattle and pigs. Leptospirosus has been found in swimming areas in other states and have resulted in outbreaks of disease. Infection or illness by Salmonella or M. tuberculosus due to swimming is also suspected. What data have been collected on the Pine River to indicate that these organisms would not be a problem there also?

Environmental Setting; page 30, paragraph 3. Would these 'pollution intolerant' organisms survive impoundment? It would be valuable in determining the character of the water if the organisms found were included in the appendix. The use of a species diversity index could improve the evaluation of the extent of any suspected disturbances. (see for example Pollution Ecology of Freshwater Invertebrates, Hart & Fuller, p. 277; and Biology and Water Pollution Control, Warren, pp. 335, 338, & 346.)

19. Environmental Setting; page 34, paragraph 2. The waters of the two wet sediment pools at sites 7 and 33 will be liable to considerable heating on warm days due to their shallowness. Such temperature increases when transferred to the streams below the structures could have a detrimental effect on trout production. This would include lethal effects on eggs during incubation because elevated temperatures increase the oxygen demand of eggs. The effect of the heating at site 7 could extend as far as Fancy Creek. Greater attention is needed in the statement as to the effect of the pools at sites 7 & 33 on Fancy Creek.

20. Environmental Setting; page 34, paragraph 3 and page 35, paragraph 1. The EIS states that wildlife habitat conditions are above average and that wildlife resources are generally abundant and highly valued. These statements do not define "above average habitat" or "generally abundant and highly valued" wildlife resources, and they totally lack documentation.

In addition to the lack of any wildlife assessment by SCS personnel, other available and directly pertinent information was not included. A list of mammals, birds (by season), amphibians, and reptiles of the Pine River Watershed was prepared by the Wildlife Ecology 550 class at the University of Wisconsin-Madison in 1975. The list was incorporated into a Draft Environmental Impact Statement and included a complete set of references. This available information should have been more extensively utilized to support the above statements.

21. Environmental Setting; page 36, paragraph 6. While the EIS acknowledges the presence of archaeological materials at site 36 and states that all artifacts will be preserved, it fails to list any plans as to how this preservation effort will take place, who will do it, and how long it will take. What are the exact plans to save the cultural material found at 24 locations within the site 36 boundary?

In addition, high priority should be given to the protection and enhancement of the area's unique character. The Wisconsin Outdoor Recreation Plan has proposed the designation of state highway 80 from Rockbridge to one mile south of Yuba and from highway 193 to one mile south of Richland Center as scenic roadways. Site 36 will inundate a sizable portion of this scenic road. Site 2 will likewise have altering effects on the southern section. The EIS failed to address the fact that uncountable aesthetic and recreational benefits may be lost by the alteration of these roadways.

22. Water and Related Land Resources Problems; pages 39-45. An environmental impact statement should be just what the title implies and NEPA demands. The use of six pages of text (pp. 39-45) containing six old photographs and some old newspaper articles is unjustified. By giving unequal weighting to educating the reader of floods of the past, other important aspects of the environmental impact analysis are slighted. This space could be devoted to a more thorough examination of the aesthetic, social and environmental impacts of this project, or at least divided between discussions of the other water and related land resource problems.

23. Water and Related Land Resources Problems; page 47, paragraph 1. Populations of upland game and wildlife in general have faced destruction of habitat not only due to loss of farm and roadside hedgerows, but additionally as the result of overgrazing of woodlots, increased numbers of feedlots on the Pine River and its tributaries, overgrazing and drainage of wetlands, and exclusion of fallow fields in crop rotation practices.

24, Relationship to Land Use Plans, Policies and Controls. page 49. The following information should be included in this section: To date some 30 exemptions to the floodplain zoning ordinance have been granted in Richland Center, and few residents of Richland Center are participating in the federally subsidized flood insurance program. (Land Use Analysis for Southwestern Wisconsin, Planning Report No. 5, SW.W.R.P.C., Dec., 1974, p. 150).

25. Relationship to Land Use Plans, Policies and Controls; page 49, paragraph 4. It should be stated as to whether or not the proposed watershed measures, including the recreational facilities, and the attendant potential for off-site commercial and scattered-site housing developments, are consistent with the stated objectives of the Richland County Land Use Plan.

26. Environmental Impacts; pages 51-52. The proposed land treatment practices are relatively inefficient at controlling nutrient runoff from agricultural land. The only nutrients that are controlled by the practices are those absorbed on particulate matter (mostly clays). During periods of surface runoff, only about 25% of the total phosphorus is associated with particulate matter, and at base flow, less than half of the phosphorus is absorbed on particulates (page 28, paragraph 1). These particulate nutrients are controlled at about the same rate as erosion control of the clay particles. But the dissolved nutrients, nearly 75% of the phosphorus and essentially all of the nitrate, is virtually uneffected by erosion control practices. Therefore, M.P.S. 2 and 36 will have high nutrient loading rates regardless of the implementation of the accelerated treatment plan. A reduction in suspended solids from streams, if not accompanied by similar nutrient reductions, could result in undesireable consequences such as a profusion of algal blooms as increased light penetration stimulates photosynthesis.

There are several methods of reducing nutrient runoff from soil that have been developed by the Soil Conservation Service. Using these methods where applicable, nitrate loss from farmland should be no greater than the amount lost from forests or grasslands (Agricultural Waste Management Field Manual, U.S.D.A., Soil Conservation Service, 1975). These practices should be employed and encouraged in the Pine River watershed. Indeed these practices could have been presented as part of the conservation land treatment measures in the "Planned Project" section of the EIS (pages 9-12).

27. Environmental Impacts; page 51, paragraph 6. The EIS states that 295 acres of pasture would be converted to cropland due to flood protection (p. 53) and 353 acres of pasture would be inundated by wet sediment pools (p. 55). If livestock numbers remain the same, overgrazing and increased soil erosion could occur on the remainder of pasture lands. Such impacts should be discussed. On the other hand, if livestock numbers are reduced to allow for the net loss of pasture, the stock reductions could be considered as a project cost. This too should be discussed.

28. Environmental Impacts; page 52, paragraph 1. The exclusion of livestock from streambanks should receive greater emphasis. The dangers of increased soil erosion, soil compaction and nutrient leading caused by livestock use of streams should be described. It is recommended that streambank fencing be considered for critical area treatment and hence become elgible for PL-566 funds. Also, alternate sources of water for livestock should be investigated while keeping stream access areas to a minimum.

29. Environmental Impacts; page 54, paragraph 5. The lakes used for comparison should be listed here or at least in the appendix, including the values used for comparison and the condition of the water and fisheries of the lakes.

30. Environmental Impacts; page 54, paragraph 6. The WDNR has suggested that any impoundment in Richland County would be a source of management problems associated with algal blooms and rough fish populations of considerable proportions (Surface Water Resources of Richland Co., 1970). The conditions in the impoundments at sites 36 and 2 should be highly eutrophic (comment immediately following). In cases where nutrient input is constantly available, plants have a continual nutritional supply throughout the growing season in the lighted and warm upper layers of a lake. The reservoirs would support large quantities of plant material, both algae on the surface and macrophytes along the shallow shoreline (particularly in the shallow upstream areas of the impoundments).

Both impoundments will be of sufficient depth to stratify, and in view of the sheltering effect of the high surrounding ridges from the wind, both impoundments are likely to stratify severely. With an abundant nutrient supply throughout the growing season, excessive plant growths will result and subsequently contribute towards high decomposition activity in the cold lower layers. The respiration processes of bacteria will utilize most of the oxygen in this area. Consequently few animal species could inhabit the deoxygenated lower layer, and coldwater, oxygen-loving species such as salmonids would undoubtably be excluded in such situations.

In brief, the impoundments will most likely exhibit characteristics far removed from those of a good quality resource. The excessive algal and macrophyte growth will choke the open water areas of the lakes, perhaps foul the air with the decomposition of plant material, consume deepwater oxygen that could be used by fish and other animals, and accumulate organic sediments which could diminish the floodwater storage utility of the structures.

31. Environmental Impacts; page 55, paragraph 1. A body of water is in danger with regard to its trophic level when its springtime concentration of assimable phosphorus compounds and inorganic nitrogen compounds exceeds 10 mg $P/m^3$ (0.01 mg/L) and 200 - 300 mg $N/m^3$ (0.30 mg/L) respectively (Vollenweider, 1968). Other studies quote similar values (Sawyer, 1952; Curry & Wilson, 1955). The forms of inorganic nitrogen most available for algal growth are nitrate and ammonia. The form of phosphorus most available for algal growth is inorganic dissolved phosphorus. When phosphate groups are cleaved from organic dissolved phosphorus, it also becomes available for algal growth.

Values in the Pine River project for nitrate and ammonia are 1.5 mg/L during runoff and 1.1 mg/L during base flow for site 2; and 1.0 mg/L during runoff and 0.35 mg/L during base flow for site 36. The values for dissolved phosphorus are 0.05 mg/L during runoff and 0.015 mg/L during base flow for site 2; and 0.11 mg/L for runoff and 0.025 mg/L during base flow for site 36. These values were obtained by taking the average of the four samples per site for base flow periods and the two samples per site during surface runoff periods. Critical levels are exceeded in every case.

Even if the impoundments were to be filled by water under base flow conditions, a potential for algal blooms nonetheless exists. When one considers values obtained during runoff periods, the levels of nutrients increase along with the potential for blooms. Furthermore, the above data do not include other forms of nitrogen (molecular and organic) and phosphorus (particulate) which may be available directly to algae. Because of these facts, a potential for major algal blooms exists and should be stated accordingly in the EIS.

References

Vollenweider, R. A. 1968. Scientific fundamentals of the eutrophication of lakes and flowing waters, with particular reference to nitrogen and phosphorus as factors in eutrophication. Organization for Economic Coop. and Development.

Curry, J. J. and S. L. Wilson. 1955. Effect of sewage-born phosphorus on algae. Sewage and Industrial Works 27:1262.

Sawyer, C. N. 1952. Some new aspects of phosphorus in relation to lake fertilization. Sewage and Industrial Works 24:768.

32. Environmental Impacts; page 55, paragraph 1. Mixing of water occurs in the upper layer of the lake. Because of upper layer mixing and continual nutrient input, algal growths will probably occur on any of the surface areas of the lakes even though the highest concentration may be in the upstream region.

Mention is made of upstream retention pools at site 36 without any discussion of their impacts or cost, nor how such retention pools would improve water quality or its health safety. If these pools were managed as marshes there could be substantial gains in terms of wetland improvement in the watershed.

Environmental Impacts; page 55, paragraph 1. Fair water quality with algal blooms and high fecal coliform counts are anticipated at both of the recreational impoundments. Since recreational demand is, to a significant degree, a function of the water based activities to be provided and, since low water quality is expected, the estimates of recreational visitations and recreational benefits seem overstated. Hence, the B-C ratio would also be inflated. This aspect needs additional comment in the EIS.

33. Environmental Impacts; page 55, paragraph 5. The implications of rerouting roads around the structure sites should receive additional attention. Specifically, this should at least include consideration of travel distances and time changes in school bus routes, mail delivery, milk pick-up, and access by farmers to their fields.

34. Environmental Impacts; page 56, tabular data. The issue of changed and inundated wetlands at the structure sites demands more attention in the impact assessment. Anticipated recreational use may preclude full development of wetlands at sites 2 and 36. Increased human disturbance at these sites will likewise diminish the utility of wetlands for wildlife.

In addition, the secondary effects of flood protection on wetlands should be described. For example, the wetlands below FWS which are maintained by periodic flooding will probably be subject to more intensive land use (e.g. pasture or conversion to cropland). This would also apply to those wetlands near the Hub City Bog which will be protected by the dam at site 36. Such protection may encourage farmers to drain these wetlands for conversion to pasture or cropland. The resultant influx of nutrients into the bog would only add to nutrient overloading. Hence, the biologic integrity of this area could be threatened. Provisions, if any for protecting the bog and other wetlands in the watershed should be described.

35. Environmental Impacts; page 57, paragraph 5. This paragraph only describes the facilities to be provided at MPS 2 and MPS 36, and in itself is not a description of any environmental impacts. The possible impacts of these facilities should be discussed, or this entire paragraph should be deleted.

36. Environmental Impacts; page 59, paragraph 5. The methodology for determining that "adequate habitat" is present in the watershed for rare and endangered species should be described. A list of these species should also be provided.

37. Environmental Impacts; Economic and Social Impacts; page 60. Income levels are considerably below the state average in both Richland and Vernon Counties (EIS p. 31, paragraph 8). Additionally, farm receipts, farm property values, and values per acre of produce, are substantially below the state average. Thirty per cent of Richland County farm operators work off-farm 100 days or more to supplement their income (EIS p. 39, paragraph 3). In light of the farmers' marginal ability to pay for the very costly land treatment measures, how much per-capita ASCS cost sharing assistance can be anticipated by these farm operators?

38. Economic and Social Impacts; page 60, paragraphs 1 and 6. The statement indicates that the threat of loss of life by drowning exists in the watershed, even though there is no documented loss of life by drowning during previous flooding events. This statement should therefore be deleted from the Final EIS, because it is an apparently insignificant threat.

The following socio-economic impact was inadequately addressed in the draft EIS. The following discussion should be included in the Final EIS as it is written here, under the section entitled "Environmental Impacts: Economic and Social." The potential risk of injury and loss of life attributable to recreational accidents at the two multipurpose sites will be created, and the risk of injury and death attributable to the increased traffic generated by these recreational facilities will be intensified. The potential danger is especially severe for pedestrians and bicyclists forced to use STH 80 as access to MPS 2, which is only about three miles south of Richland Center. Presently, STH 80 from Richland Center to proposed MPS 2 is a narrow road through hilly terrain, with restricted sight-lines and the maximum speed limit. Safety improvements such as a paved pathway for nonmotorized traffic, and a speed reduction for STH 80 should be included in the development plans. On weekends, an estimated 1,222 persons will make over 600 automobile trips to MPS 36, and an estimated 658 persons will make over 300 auto trips to MPS 2 each day, will significantly increase traffic congestion near these two recreational facilities.

39. Environmental Impacts; page 60, paragraph 2. It is stated that the "quality of man's environment" and "the quality of life" will improve as a result of flood protection. This is highly subjective. Flooding may also improve environmental quality because it curtails more intensive land use in flood-prone areas. In this respect, flooding "preserves" open space, wildlife habitat, plant and animal diversity and therefore contributes toward environmental quality.

Environmental enhancement can be an integral part of a watershed project. Similarly, certain components can have a significant negative impact on the area's aesthetic nature. Perhaps a section in the impact statement under "Environmental Impacts" should have specifically addressed how the various components contribute to aesthetic enhancement or degradation. Those project measures to be dealt with in such a review could include the structures, lakes and recreation areas, borrow sites, various construction features and conservation land treatment.

40. Environmental Impacts; page 60, paragraph 3. It is unclear that the opportunities for individual farmers or others, will be significantly increased, as is stated, because farmers may lack the necessary skills to perform the 30 skilled positions that will be created. These skilled jobs would include field engineers, construction supervisors, and managers, inspectors, heavy equipment operators, and other construction tradespeople. Many of these skilled positions will undoubtedly require union affiliation, further restricting entry by the local labor force. Furthermore, it can be expected that most or all of these positions will be filled by the outside labor resources of the project contractors. Additionally, most construction activity will likely occur during the planting, cultivating and harvesting seasons. Construction employment therefore will not be available to any great extent to the area farm operators. However, most of the 28 semi-skilled jobs could be expected to be filled by local labor base. Upon completion of the project, there will be a negative economic impact on the community and the released workers, when these 58 jobs are terminated at the end of the eight year construction period. The above discussion should be inserted in the Final EIS in place of the inadequate and unrealistic third paragraph which is in the Draft EIS.

41. Environmental Impacts; page 60, paragraph 4. A brief summary should be presented regarding the type, amount, and annual normalized value of the increased productivity which is expected from flood protected areas. Also, the type, quantity and comparable values of agricultural production to be foregone on that portion of the 4,817 acres which will be converted to project uses should be presented. This will give readers some idea of the productivity increases which must be achieved in order to compensate for the real losses of production permanently foregone on many of the 4,817 acres which will be converted for project purposes.

42. Environmental Impacts; page 60, paragraph 7. No evaluation has been made of offsite induced costs to local government that would be causes by the influx of recreationists to MPS 2 and MPS 36. Induced costs would reflect additional police patrols, ambulance and fire calls, roadway maintainance, roadside litter removal, and the like.

43. Environmental Impacts; page 60, paragraph 8. What assurances can be given that the intended environmental buffer around the recreational sites will be purchased by the Richland County SWCD? This buffer is necessary to preserve the natural character of the recreational areas, and to prevent encroachment by residential development.

44. Environmental Impacts; page 60, paragraph 8. The statement . . . "may be disruptive to the present lifestyle of local citizens" is an insufficient assessment of the situation. There will be 142,800 annual visitations in a watershed of less than 10,000 people. Major impacts incurred by the resident population will surely result and these should be identified.

Responses should include but should not necessarily be limited to the following considerations.

a) Recreational development will conflict with the present lifestyle of the community.

b) There will be changes in buying/service demands from an agricultural to an urban-recreation orientation.

c) There will be a rising demand for community services (both quantitatively and qualitatively) with a resulting increase in taxes.

d) The increased taxes will have an adverse impact on retired home owners and others on a fixed income.

e) It is quite likely that outsiders will make the major new investments in the community as a result of the project and consequently receive the major project benefits. This has happened elsewhere in the State. Will the local residents welcome this intrusion or will they resent it? Will this significantly disturb the local residents' sense of community, security and privacy in this rather isolated watershed?

45. Favorable Environmental Effects; page 61, paragraph 1. What justification can be made for showing flood damage reductions from \$269,000 to \$0 annually in the urban areas of Hub City, Rockbridge and Richland Center, when some of the flooding in Richland Center has been attributed to runoff from the hill immediately east of town washing down the streets and overloading the sewer system?

46. Favorable Environmental Effects, page 61, paragraph 3. The National Commission on Water Quality reported in "Water Quality Analysis and Environmental Impacts Assessment of Public Law 92-500" (Jan. 1976) that;

> Any characterization of sediment as a pollutant requires recognition that flowing waters have fixed minimum sediment carrying capacities. If controls reduce suspended solids to below these minimum levels, flowing water will attempt to restore the minimums by scouring the beds and banks of the watercourse until the minimum carrying capacity is satisfied. (page A-22).

This increased erosion could necessitate downstream erosion controls, such as channelization, riprap, and waterways.

Has this increased erosion potential below the dam sites been taken into account in computing the reduction in sediment delivered to the Wisconsin River (line 4)?

47. Favorable Environmental Effects; page 61, paragraph 7. One justification of this PL 566 project is $14,200 in annual benefits which will accrue from the intensified use of agricultural lands that are to receive flood protection. A study* conducted in 1969 of a similar PL 566 project on the Coon Creek watershed in Vernon County, Wisconsin, revealed that actual land use conversion occured on less than 1/6 of the 374 acres predicted by the SCS in the Work Plan. Please indicate if and how this low rate of response by farmers to the perception of changes in flood frequency, has been considered in the estimation of "changed land use" benefits for the Pine River watershed project, to avoid overstating these benefits. (*"Effects of Flood Protection on Land Use in the Coon Creek, Wisconsin, Watershed," by D. F. Theiler in Water Resources Research, vol. 5, no. 6, December1969.

48. Favorable Environmental Effects; page 61, paragraph 9. It is stated that high quality grass cover will be provided for wildlife habitat at all dam sites. A description of the wildlife species will benefit from this cover, and the particular grass species will be planted should be included.

49. Environmental Impacts, Adverse Effects; page 62. Richland County supports the highest bobwhite population in the state. WDNR has engaged in a costly quail habitat improvement program in southwestern Wisconsin including the Pine River Watershed. Bobwhite are not recognized in the EIS as even being present in the watershed, even though specific WDNR habitat improvement has been completed or is scheduled at sites 9, 14, and 33. Bobwhite are currently on the changing species list of the WDNR and are adversely affected by destruction of shrubby hedgerow cover along fences, fields, woodlands, streams, and roadsides. Such habitat will be lost through road relocation, inundation by sediment and permanent pools, and "clean farming" practices associated with the Pine River watershed project.

The red-shouldered hawk, also on the changing species list, will be adversely affected by the project. The WDNR bulletin, Endangered Species in Wisconsin, lists stream straightening, impoundments, water pollution, and pesticides as threats to the red-shouldered hawk's existence. These problems should be mentioned in the Adverse Environmental Effects section of the EIS.

50. Environmental Impacts; page 62, paragraph 3. This entire generalized statement is to be stricken from the Final EIS, unless supporting justification or documentation is provided.

51. Environmental Impacts; page 62, paragraph 8. Vacated reaches of roads and power lines if left to deteriorate will have a definite negative aesthetic effect on the continuum of landscape as viewed by the individual. What measures will be taken to reclaim vacated portions of roads and remove power lines to produce a more favorable landscape?

52. Environmental Impacts; page 62, paragraph 11. The EIS states that habitat for populations of muskrat, mink, and sparrow hawks will be reduced by construction of site 36. Other species will be affected by the impoundment and should be listed as affected or potentially affected.

53. Alternatives; pages 65-69 (general comments). Only six of the eleven alternatives investigated by the SCS in September 1975 are listed in the EIS "Alternatives" section. Also, we were unable to locate any economic discussion or documentation of Alternative 8 (large dam north of Richland Center). It would be of considerable value to have all pertinent economic data for each alternative (especially benefit and cost information) listed in a consistent and uniform way such as in a table. A discussion of where benefits are received and costs are incurred would also be useful.

54. Alternatives; page 67 paragraphs 4, 6, page 68, paragraph 1. Several negative references to the dike in Alternative 4 do not appear in the descriptions of Alternatives 5, 6, and 7 which also contain the dike. Uniform commentary would be beneficial to readers in assessing the various alternatives.

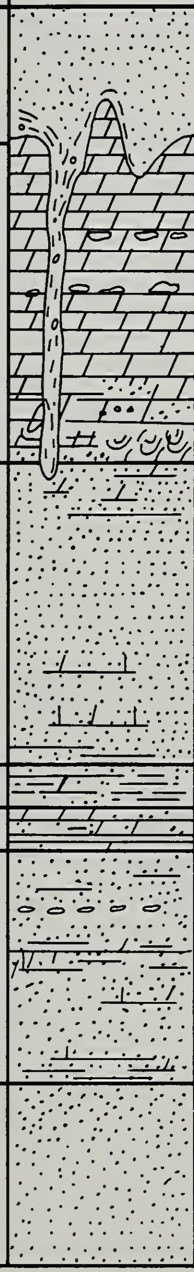
55. Irreversible and Irretrievable Commitments of Resources; page 73, paragraph 1. The loss of 328 acres of wetlands, inundated by structures and wet sediment pools, should have been included in the section on irreversible and irretrievable commitments of resources. The many valuable functions which wetlands provide should also be included.

56. Irreversible and Irretrievable Commitments of Resources; page 73. The unique landforms of the Pine River Watershed give the area much of its aesthetic appeal. The natural arrangement of ridges, with valleys between, combine with cliff outcroppings of sandstone and dolomite to provide many scenic vistas which are valuable resources. Retaining these resources is a stated "priority objective" of the 1972 Wisconsin Outdoor Recreation plan for Region 3. Some of these landforms and vistas will be inundated by the planned structural measures, thereby affecting aesthetic appeal. These obstructions of valley vistas and inundations of unique cliffs should be listed as irreversible and irretrievable commitments of resources.

APPENDIX C

TABLE I

# GENERALIZED PALEOZOIC-STRATIGRAPHIC COLUMN
## PINE RIVER WATERSHED
## RICHLAND AND VERNON COUNTIES, WISCONSIN



| SYSTEM | SERIES | GROUP | FORMATION | MEMBER | LITHOLOGY | DESCRIPTION |
|---|---|---|---|---|---|---|
| ORDOVICIAN | CHAMP-LAINIAN (CHAZYAN) | | ST. PETER | TONTI READSTOWN | | **ST. PETER FM** SANDSTONE, MOSTLY WHITE, ALSO BUFF TO RED-BROWN, MEDIUM GRAINED, MASSIVE, WELL-CEMENTED, BLOCKY FRACTURE. BASAL READSTOWN MEMBER IS ONEOTA CLAY RESIDUUM WITH SS BLOCKS. UNCONFORMABLE AT BASE INTO UPPER JORDAN FM. THICKNESS 0-70+ FEET |
| | | | | | | UNCONFORMITY |
| ORDOVICIAN | CANADIAN (BEEK MANTOWNIAN) | PRAIRIE DU CHIEN | ONEOTA | | | **ONEOTA FM** DOLOMITE, WHITE, GRAY, MASSIVE TO THIN BEDDED, FRACTURE ROUGH AND BLOCKY, CAVITIES, CHERTY AND OOLITIC LAYERS; <u>CRYPTOZOON SPP</u>. ALGAL COLONIES, SANDSTONE LENSES AND SHALE PARTINGS BASAL PORTION; UPPER SURFACE IRREGULAR AND PITTED. THICKNESS 0-175 FEET |
| CAMBRIAN | ST. CROIXIAN | TREMPEALEAU | JORDAN | | | **JORDAN FM** SANDSTONE, WHITE TO BUFF, YELLOW, BROWN, FINE TO MEDIUM GRAIN, MASSIVE TO THINLY BEDDED, FAIR TO POORLY CEMENTED; ORTHO-QUARTZITE UPPER PART; CALCAREOUS, FRIABLE, WORM BURROWS, SHALE PARTINGS, FINER GRAINED AND SILTY LOWER PORTION; LOCALLY WITH HIGH CONCENTRATIONS OF IRON OXIDE. THICKNESS 85-160 FEET |
| | | | ST. LAWRENCE | LODI | | **LODI MEMBER** SILTSTONE, BUFF TO OLIVE, SHALY, DOLOMITIC, VERY FINE GRAINED SAND, THIN BEDDED TO LAMINATED. THICKNESS 3-16+ FEET |
| | | | | BLACK EARTH | | **BLACK EARTH MEMBER** DOLOMITE ALTERNATING WITH DOLOMITIC SILTSTONE AND SANDSTONE, BLUE-GRAY TO BUFF, THICK TO THIN BEDDED, GLAUCONITIC, INTRAFORMATIONAL AND BASAL CONGLOMERATE. THICKNESS 3-24 FEET |
| | | | FRANCONIA | | | **FRANCONIA FM** SANDSTONE, GRAY-GREEN, BUFF TO YELLOW-BROWN, THIN BEDDED, OFTEN CROSS BEDDED, FINE GRAINED, GLAUCONITIC, SILTY, SHALY, FAIR TO POORLY CEMENTED, VERTICAL AND BEDDING PLANE JOINTS, PERMEABLE, INTRAFORMATIONAL CONGLOMERATES, MOTTLED, AND WORM BURROWS. THICKNESS 85-125 FEET |
| | | DRESBACH | GALESVILLE | | | **GALESVILLE FM** SANDSTONE, WHITE-GRAY, YELLOW TO BUFF, MASSIVE CROSS BEDDED, MEDIUM GRAINED, FRIABLE, VERTICAL JOINTS; BASAL VALLEY WALL SCARP FORMER. THICKNESS 60+ FEET |


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TABLE 2
LOCATIONS OF WATER QUALITY AND BIOLOGICAL SAMPLING SITES
PINE RIVER WATERSHED
RICHLAND AND VERNON COUNTIES
WISCONSIN
LEGEND
COUNTY LINE
U.S. TOWNSHIP LINE
SECTION LINE
SECTION NUMBER 22
PAVED ROAD
GRAVEL ROAD
DIRT ROAD
RAILROAD
CROSSING (GRADE)
SCHOOL
CHURCH
CEMETERY
CITY
DRAINAGE
SWAMP
DAM AND LAKE
QUARRY OR SAND PIT
WATERSHED BOUNDARY
PROPOSED STRUCTURE 32
SAMPLE SITE 14A4
WISCONSIN
SOURCE
SCS DRAWING NUMBER 5,P-25,444 (12-67) AND INFORMATION FROM FIELD TECHNICIANS. POLYCONIC PROJECTION
SCALE 1 / 206,000
SCALE 1 0 1 2 3 4 MILES
12-5-75
5,P-35,476

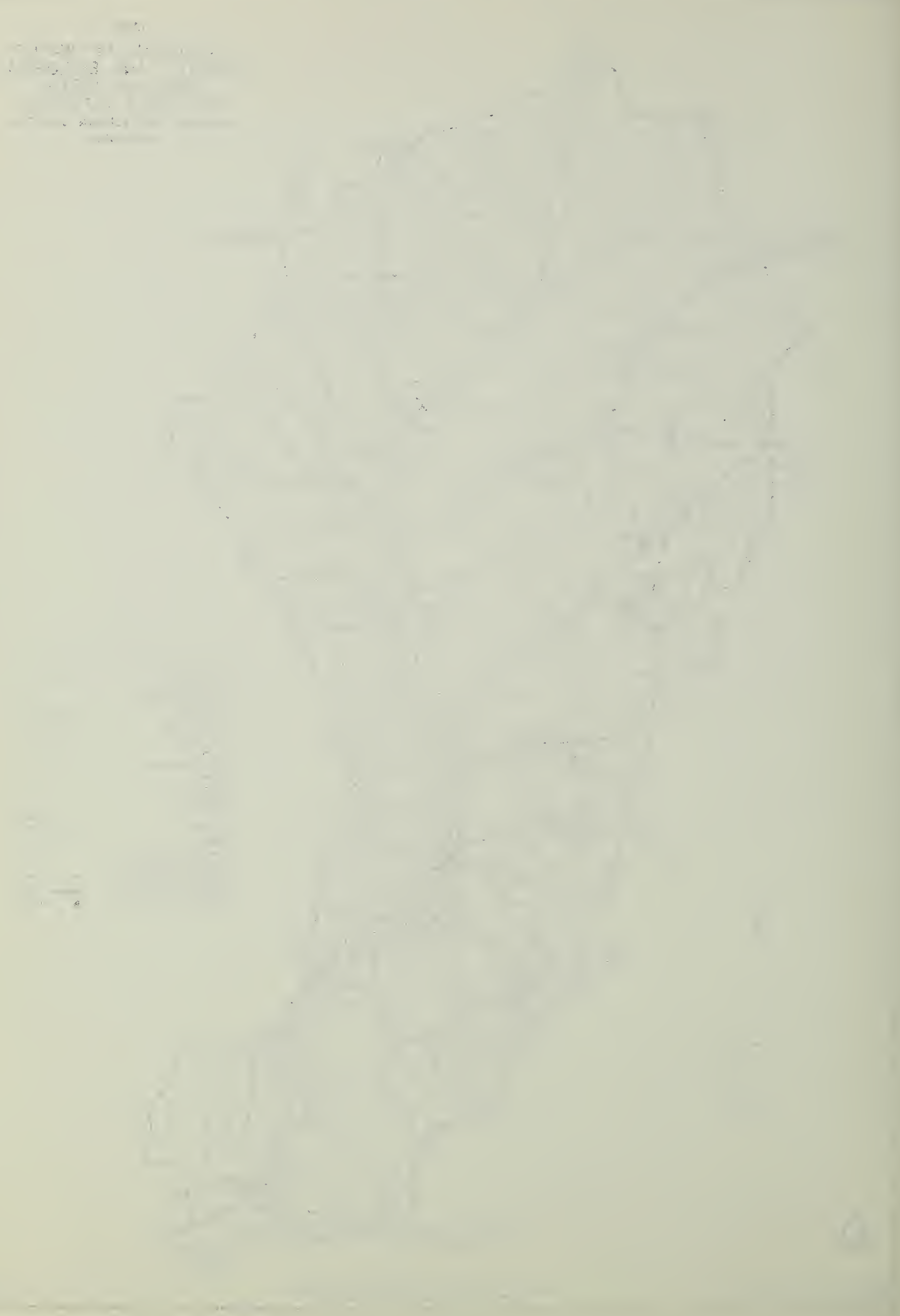


TABLE 3

Sample Site 1 -MAIN BRANCH OF PINE BELOW RICHLAND CENTER

| Item | Unit | May 14, 1974<br>1 | June 3, 1974<br>1 | September 9, 1974<br>1 |
|---|---|---|---|---|
| Instantaneous discharge | CFS | 489 | 152 | 123 |
| Temperature | C | 11.0 | 19.0 | 20.0 |
| Dissolved Oxygen | mg/l | 10.4 | 8.0 | 9.0 |
| Specific Conductance | uMHOS | 329 | 440 | 450 |
| Turbidity | JTU | 40 | 10 | 20.0 |
| Color | platinum cobalt units | 50 | 6 | 5 |
| pH | | 7.7 | 7.7 | 8.0 |
| Alkalinity | mg/l | 149 | 223 | 219 |
| Carbonate | mg/l | 0 | 0 | 0 |
| Bicarbonate | mg/l | 182 | 272 | 267 |
| Carbon Dioxide | mg/l | 5.8 | 8.7 | 4.3 |
| Dissolved Solids | mg/l | 180 | 250 | 244 |
| Suspended Sediments | mg/l | 127 | 46 | - |
| Total Kjeldahl Nitrogen | mg/l | .52 | .30 | .52 |
| Ammonia Nitrogen | mg/l | .08 | .01 | .03 |
| Total Nitrite | mg/l | .01 | .02 | .15 |
| Total Nitrate | mg/l | .98 | .48 | .58 |
| Dissolved Kjeldahl Nitrogen | mg/l | .49 | .22 | .23 |
| Dissolved Ammonia Nitrogen | mg/l | .08 | .05 | .04 |
| Dissolved Nitrite | mg/l | .00 | .02 | .16 |
| Dissolved Nitrate | mg/l | .99 | .52 | .57 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 210 | 110 | 340 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | 1.5 | 2.0 | 7.5 |
| Total Phorphorus | mg/l | .29 | .37 | 2.6 |
| Dissolved Phosphorus | mg/l | .15 | .33 | .17 |
| Total Phosphorus on Bottom Deposits | mg/kg | 64 | 100 | 96 |
| Dissolved Carbon | mg/l | 5.0 | 3.2 | 8.1 |
| Fecal Coliform | colonies/ 100 ml | - | 13,000 | E5,200 |
| Streptococci | colonies/ 100 ml | 2,400 | E120,000 | 1,000 |

TABLE 3 - Continued

Sample Site 1 -MAIN BRANCH OF PINE BELOW RICHLAND CENTER

| Item | Unit | March 20, 1975<br>1 | May 15, 1975<br>1 | June 17, 1975<br>1 |
|---|---|---|---|---|
| Instantaneous discharge | CFS | 643 | 163 | 210 |
| Temperature | °C | 3.0 | 13.5 | 14.5 |
| Dissolved Oxygen | mg/l | 8.6 | 9.2 | 9.8 |
| Specific Conductance | uMHOS | 220 | 420 | 410 |
| Turbidity | JTU | 60 | 20 | 20 |
| Color | platinum cobalt units | 100 | 10 | 7 |
| pH | | 7.1 | 7.7 | 8.0 |
| Alkalinity | mg/l | 86 | 216 | 208 |
| Carbonate | mg/l | 0 | 0 | 0 |
| Bicarbonate | mg/l | 105 | 263 | 254 |
| Carbon Dioxide | mg/l | 13 | 8.4 | 4.1 |
| Dissolved Solids | mg/l | 144 | 255 | 228 |
| Suspended Sediments | mg/l | 311 | 76 | 94 |
| Total Kjeldahl Nitrogen | mg/l | 5.6 | .61 | .61 |
| Ammonia Nitrogen | mg/l | 2.7 | .05 | .07 |
| Total Nitrite | mg/l | .04 | .01 | .02 |
| Total Nitrate | mg/l | .75 | .54 | .72 |
| Dissolved Kjeldahl Nitrogen | mg/l | 4.3 | .25 | .33 |
| Dissolved Ammonia Nitrogen | mg/l | 2.3 | .05 | .09 |
| Dissolved Nitrite | mg/l | .03 | .00 | .00 |
| Dissolved Nitrate | mg/l | .81 | .53 | .70 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 190 | 130 | 61 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | 30 | 7.0 | 6.0 |
| Total Phorphorus | mg/l | .81 | .19 | .19 |
| Dissolved Phosphorus | mg/l | .47 | .10 | .06 |
| Total Phosphorus on Bottom Deposits | mg/kg | 85 | 50 | 33 |
| Dissolved Carbon | mg/l | 23 | 7.5 | 12 |
| Fecal Coliform | colonies/ 100 ml | B2,000 | 510 | 2,800 |
| Streptococci | colonies/ 100 ml | 21,000 | 190 | 6,200 |

TABLE 4

SAMPLE SITE NO. 2A & 2B - ASH CREEK

| Item | Unit | May 14, 1974 2A | May 14, 1974 2B | June 3, 1974 2A | June 3, 1974 2B | September 9, 1974 2A | September 9, 1974 2B |
|---|---|---|---|---|---|---|---|
| Instantaneous discharge | CFS | 3.4 | 6.4 | 1.2 | 2.2 | 1.4 | 2.2 |
| Temperature | °C | 9.0 | 12.0 | 12.0 | 12.0 | 13.5 | 17.0 |
| Dissolved Oxygen | mg/l | 11.5 | 11.2 | 11.3 | 11.3 | 9.9 | 11.5 |
| Specific Conductance | uMHOS | 314 | 349 | 450 | 460 | 480 | 460 |
| Turbidity | JTU | 6 | 10 | 2 | 2 | 1 | 1 |
| Color | platinum cobalt units | 20 | 20 | 3 | 4 | 5 | 5 |
| pH | | 7.8 | 8.0 | 8.0 | 8.2 | 7.9 | 8.2 |
| Alkalinity | mg/l | 143 | 162 | 235 | 242 | 235 | 228 |
| Carbonate | mg/l | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicarbonate | mg/l | 174 | 197 | 286 | 295 | 287 | 278 |
| Carbon Dioxide | mg/l | 4.4 | 3.2 | 4.6 | 3.0 | 5.8 | 2.8 |
| Dissolved Solids | mg/l | 183 | 202 | 256 | 268 | 264 | 240 |
| Suspended Sediments | mg/l | 17 | 55 | 19 | 8 | - | - |
| Total Kjeldahl Nitrogen | mg/l | .42 | .38 | .09 | .17 | .30 | .18 |
| Ammonia Nitrogen | mg/l | .08 | .07 | .00 | .00 | .00 | .00 |
| Total Nitrite | mg/l | .01 | .01 | .01 | .01 | .01 | .01 |
| Total Nitrate | mg/l | 1.4 | 1.4 | 1.3 | .94 | 1.2 | .86 |
| Dissolved Kjeldahl Nitrogen | mg/l | .54 | .25 | .00 | .17 | .30 | .14 |
| Dissolved Ammonia Nitrogen | mg/l | .07 | .08 | .01 | .01 | .00 | .00 |
| Dissolved Nitrite | mg/l | .00 | .00 | .01 | .01 | .00 | .01 |
| Dissolved Nitrate | mg/l | 1.4 | 1.4 | 1.3 | .94 | 1.3 | .89 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 350 | 320 | 370 | 470 | 340 | 320 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | .5 | .5 | .0 | .0 | .5 | 2.5 |
| Total Phorphorus | mg/l | .10 | .11 | .01 | .00 | .03 | .03 |
| Dissolved Phosphorus | mg/l | .05 | .05 | .01 | .00 | .03 | .02 |
| Total Phosphorus in Bottom Deposits | mg/kg | 120 | 150 | 130 | 220 | 160 | 190 |
| Dissolved Carbon | mg/l | 50 | - | 2.8 | 6.5 | .9 | 1.3 |
| Fecal Coliform | colonies/ 100 ml | 5500 | 1700 | 290 | 570 | 830 | 190 |
| Streptococci | colonies/ 100 ml | 1400 | 730 | 200 | 340 | 240 | 290 |

TABLE 4 - Continued

SAMPLE SITE NO. 2A & 2B - ASH CREEK

| Item | Unit | March 19, 1975 | | May 14, 1975 | | June 16, 1975 | |
|---|---|---|---|---|---|---|---|
| | | 2A | 2B | 2A | 2B | 2A | 2B |
| Instantaneous discharge | CFS | 2.4 | 8.8 | 1.1 | 2.0 | 1.3 | 2.2 |
| Temperature | °C | 6.0 | 3.5 | 14.5 | 17.0 | 12.0 | 14.0 |
| Dissolved Oxygen | mg/l | 9.4 | 10.8 | 11.2 | 10.5 | 10.2 | 10.7 |
| Specific Conductance | uMHOS | 370 | 270 | 430 | 410 | 440 | 450 |
| Turbidity | JTU | 20 | 40 | 2 | 2 | 1 | 2 |
| Color | platinum cobalt units | 100 | 100 | 7 | 5 | 0 | 3 |
| pH | | 7.4 | 7.4 | 8.1 | 8.4 | 8.1 | 8.2 |
| Alkalinity | mg/l | 189 | 117 | 226 | 214 | 233 | 233 |
| Carbonate | mg/l | 0 | 0 | 0 | 5 | 0 | 0 |
| Bicarbonate | mg/l | 230 | 142 | 275 | 251 | 284 | 284 |
| Carbon Dioxide | mg/l | 15 | 9.0 | 3.5 | 1.7 | 3.6 | 2.9 |
| Dissolved Solids | mg/l | 229 | 160 | 259 | 233 | 248 | 291 |
| Suspended Sediments | mg/l | 477 | 360 | 7 | 5 | 22 | 31 |
| Total Kjeldahl Nitrogen | mg/l | 5.3 | 4.0 | .43 | .23 | .06 | .14 |
| Ammonia Nitrogen | mg/l | 3.2 | 2.5 | .02 | .00 | .01 | .06 |
| Total Nitrite | mg/l | .01 | .03 | .00 | .01 | .01 | .01 |
| Total Nitrate | mg/l | .37 | .85 | 1.2 | .71 | 1.1 | .93 |
| Dissolved Kjeldahl Nitrogen | mg/l | 5.2 | 4.2 | .37 | .17 | .25 | .29 |
| Dissolved Ammonia Nitrogen | mg/l | 2.6 | 2.1 | .02 | .00 | .01 | .07 |
| Dissolved Nitrite | mg/l | .05 | .03 | .00 | .01 | .00 | .01 |
| Dissolved Nitrate | mg/l | 1.0 | .84 | 1.2 | .72 | 1.1 | .92 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 2,700 | 2,900 | 170 | 89 | 160 | 970 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | 12 | 3.0 | 8.5 | .0 | 2.0 | .5 |
| Total Phorphorus | mg/l | .69 | .83 | .02 | .01 | .03 | .05 |
| Dissolved Phosphorus | mg/l | .71 | .63 | .01 | .01 | .01 | .02 |
| Total Phosphorus in Bottom Deposits | mg/kg | 460 | 600 | 72 | 73 | 150 | 290 |
| Dissolved Carbon | mg/l | 36 | 24 | 16 | 3.7 | 1.1 | 1.9 |
| Fecal Coliform | colonies/ 100 ml | 3,300 | B4,000 | 280 | 3,800 | 2,100 | 1,600 |
| Streptococci | colonies/ 100 ml | B7,000 | 16,000 | 87 | 150 | 900 | 3,800 |

TABLE 5

SAMPLE SITE NO. 36A & 36B - MAIN BRANCH OF PINE

| Item | Unit | May 14, 1974 36A | May 14, 1974 36B | June 3, 1974 36A | June 3, 1974 36B | September 9, 1974 36A | September 9, 1974 36B |
|---|---|---|---|---|---|---|---|
| Instantaneous discharge | CFS | 56 | 98 | 19 | 32 | 10 | 25 |
| Temperature | C | 5.0 | 7.0 | 18.5 | 18.0 | 16.5 | 17.5 |
| Dissolved Oxygen | mg/l | 12.5 | 11.3 | 14.0 | 11.0 | 11.2 | 11.2 |
| Specific Conductance | uMHOS | 253 | 264 | 348 | 347 | 396 | 410 |
| Turbidity | JTU | 20 | 30 | 3 | 4 | 2 | 2 |
| Color | platinum cobalt units | 30 | 60 | 7 | 7 | 1 | 5 |
| pH | | 7.8 | 7.7 | 8.6 | 8.2 | - | - |
| Alkalinity | mg/l | 108 | 113 | 204 | 193 | 213 | 200 |
| Carbonate | mg/l | 0 | 0 | 10 | 0 | 0 | 1 |
| Bicarbonate | mg/l | 132 | 138 | 229 | 235 | 260 | 242 |
| Carbon Dioxide | mg/l | 3.3 | 4.4 | 1.0 | 2.4 | - | - |
| Dissolved Solids | mg/l | 148 | 154 | 224 | 202 | 218 | 230 |
| Suspended Sediments | mg/l | 65 | - | 15 | 10 | - | - |
| Total Kjeldahl Nitrogen | mg/l | .31 | .33 | .19 | .26 | .29 | .19 |
| Ammonia Nitrogen | mg/l | .01 | .06 | .02 | .04 | .00 | .00 |
| Total Nitrite | mg/l | .01 | .01 | .01 | .01 | .01 | .01 |
| Total Nitrate | mg/l | .93 | .92 | .36 | .31 | .40 | .20 |
| Dissolved Kjeldahl Nitrogen | mg/l | .39 | .43 | .26 | .23 | .28 | .20 |
| Dissolved Ammonia Nitrogen | mg/l | .05 | .08 | .02 | .00 | .02 | .00 |
| Dissolved Nitrite | mg/l | .00 | .00 | .01 | .01 | .01 | .01 |
| Dissolved Nitrate | mg/l | .94 | .94 | .36 | .31 | .43 | .24 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 330 | 99 | 170 | 160 | 520 | 2,000 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | .5 | .0 | .0 | 3.0 | .5 | .5 |
| Total Phorphorus | mg/l | .10 | .17 | .02 | .03 | .05 | .05 |
| Dissolved Phosphorus | mg/l | .13 | .09 | .01 | .01 | .04 | .04 |
| Total Phosphorus in Bottom Deposits | mg/kg | 170 | 130 | 90 | 75 | 160 | 380 |
| Dissolved Carbon | mg/l | 6.4 | - | 4.9 | - | 1.8 | 17 |
| Fecal Coliform | colonies/ 100 ml | - | - | 670 | B140 | 970 | 670 |
| Streptococci | colonies/ 100 ml | B100 | B700 | 98 | 150 | 350 | 200 |

TABLE 5 - Continued

SAMPLE SITE NO. 36A & 36B - MAIN BRANCH OF PINE

| Item | Unit | March 20, 1975 | | May 15, 1975 | | June 17, 1975 | |
|---|---|---|---|---|---|---|---|
| | | 36A | 36B | 36A | 36B | 36A | 36B |
| Instantaneous discharge | CFS | 45 | 87 | 17 | 30 | 35 | 46 |
| Temperature | °C | 3.0 | 2.5 | 12.5 | 13.0 | 14.5 | 14.5 |
| Dissolved Oxygen | mg/l | 11.8 | 10.4 | 13.5 | 11.5 | 8.3 | 8.4 |
| Specific Conductance | uMHOS | 255 | 230 | 400 | 400 | 460 | 415 |
| Turbidity | JTU | 7 | 20 | 2 | 3 | 35 | 10 |
| Color | platinum cobalt units | 100 | 80 | 8 | 6 | 23 | 10 |
| pH | | 7.2 | 6.9 | 8.2 | 8.0 | 8.0 | 7.8 |
| Alkalinity | mg/l | 106 | 103 | 199 | 195 | 189 | 195 |
| Carbonate | mg/l | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicarbonate | mg/l | 129 | 125 | 243 | 238 | 231 | 238 |
| Carbon Dioxide | mg/l | 13 | 25 | 2.5 | 3.8 | 3.7 | 6.0 |
| Dissolved Solids | mg/l | 174 | 160 | 200 | 194 | 232 | 235 |
| Suspended Sediments | mg/l | 70 | 150 | 5 | 8 | 112 | 55 |
| Total Kjeldahl Nitrogen | mg/l | 4.9 | 5.1 | .28 | .27 | 1.1 | .58 |
| Ammonia Nitrogen | mg/l | 2.4 | 2.2 | .00 | .01 | .13 | .04 |
| Total Nitrite | mg/l | .03 | .03 | .01 | .01 | .03 | .03 |
| Total Nitrate | mg/l | .97 | .88 | .35 | .27 | .68 | .56 |
| Dissolved Kjeldahl Nitrogen | mg/l | 4.2 | 3.9 | .23 | .16 | .67 | .39 |
| Dissolved Ammonia Nitrogen | mg/l | 2.1 | 2.0 | .00 | .01 | .15 | .05 |
| Dissolved Nitrite | mg/l | .03 | .02 | .01 | .01 | .03 | .02 |
| Dissolved Nitrate | mg/l | 1.1 | .90 | .35 | .28 | .62 | .56 |
| Total Kjeldahl Nitrogen in Bottom Deposits | mg/kg | 910 | 1,000 | 610 | 680 | 130 | 320 |
| Total Nitrite & Nitrate in Bottom Deposits | mg/kg | 4.0 | 2.0 | .0 | .0 | .5 | 9.5 |
| Total Phorphorus | mg/l | .76 | .74 | .03 | .04 | .24 | .12 |
| Dissolved Phosphorus | mg/l | .70 | .63 | .02 | .02 | .10 | .05 |
| Total Phosphorus in Bottom Deposits | mg/kg | 270 | 130 | 250 | 98 | 110 | 97 |
| Dissolved Carbon | mg/l | 23 | 20 | 12 | 13 | 7.8 | 4.2 |
| Fecal Coliform | colonies/ 100 ml | 1,000 | 900 | 390 | 170 | 17,000 | 1,600 |
| Streptococci | colonies/ 100 ml | 16,000 | 13,000 | B58 | 80 | 12,000 | 1,600 |

TABLE 6 - SUMMARY OF MACROINVERTEBRATES COLLECTED AT THE PINE RIVER WATERSHED SAMPLING SITES

| | Station 1 | | | | Station 2B | | | | Station 3 | | | | Station 4B | | | | Station 7B | | | | Station 9B | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | July 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 |
| Coleoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Dryopidae | | | | | | 5 | | | | | | | 4 | | | | 1 | 2 | | | 2 | | 1 | 2 |
| Dytiscidae | | 2 | | | | | | 1 | 1 | | | | | | | | | | | 1 | | | | 1' |
| Elmidae | | | | | 1 | | 1 | | 1 | | | | 3 | 2 | | 4 | | 10 | 3 | 8 | 11 | 20 | 27 | 22 |
| Gyrinidae | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Haliplidae | | | 3 | | | | | | | | | | | | | | | | | | | | | |
| Hydrophilidae | | 1 | | 1 | 1 | | | | | | | | | | 1 | 1 | | | | | | | | |
| Diptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Chironomidae | 2 | 3 | 3 | | 5 | 8 | 4 | 6 | 5 | | 2 | | 2 | 8 | 4 | 8 | 12 | 4 | 12 | 6 | 13 | 6 | 17 | 2 |
| Culicidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Dixidae | | | | | | | | | | | 1 | | | | | | | | | | | | | |
| Empedidae | | | | | | 1 | | | | | | | | | | | | | 1 | | 1 | | | |
| Muscidae | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| Phoridae | | | | | | | | | | | | | | | | | | | | | | | | |
| Rhagionidae | | | 1 | | | | | 2 | | | | | | 3 | | 1 | | 4 | | 1 | | 3 | | |
| Simuliidae | | | | | 6 | 1 | 2 | 3 | 6 | 3 | 1 | | 3 | 2 | 1 | 4 | 1 | 3 | 2 | 9 | | | | |
| Stratiomyidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Tipulidae | | | | | 3 | 3 | | | | | | | 1 | 7 | | | | 1 | 1 | | | 3 | 1 | |
| Ephemeroptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Baetidae | 9 | 5 | 3 | 6 | 11 | 21 | 23 | 32 | 9 | 4 | 7 | 4 | 7 | 24 | 32 | 24 | 5 | 10 | 18 | 14 | 7 | 5 | | 5 |
| Baetiscidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Coenidae | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| Ephemerellidae | | | | | | | | | | | 1 | | 9 | | | | | | | | | | | |
| Heptageniidae | | | | 11 | | | | | 6 | 2 | | 7 | | 1 | 5 | | 1 | 1 | 4 | 1 | 4 | 1 | 1 | |
| Leptophlebiidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Siphlonuridae | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Tricorythidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Hemiptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Belostomatidae | | 1 | | | | | | | | 1 | | | | | | | | | | | | | | |
| Corixidae | 2 | 2 | 2 | 3 | | | | | 1 | | 2 | | | | | 2 | | | | | | | | |
| Gerridae | | | | | 1 | | 1 | 3 | | | | | 1 | 2 | | 3 | 2 | | | | | | | |
| Pleidae | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Veliidae | | | | | | | | | | | | | | 2 | 1 | 1 | | | | | | | | |
| Odonata | | | | | | | | | | | | | | | | | | | | | | | | |
| Aeshnidae | | | | | | | | | | | | | 2 | | 1 | 2 | | | | | | | | |
| Calopterygidae | 1 | | 1 | | 1 | | | | 2 | 1 | | | | 2 | | 1 | 7 | | | | | | | |
| Coenagrionidae | | | | | 1 | | | | 1 | | | | | | | | | | | | | | | |
| Gomphidae | | | | | | | | | | | | | | 5 | 1 | | | | 1 | | | | | |
| Plecoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Nemouridae | | | | | | | | | | | | | | | | | | | | | | | 2 | |
| Perlidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Perlodidae | | | | | | | | | | | | | | | | | | | | | | | 3 | |
| Pteronarcidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Trichoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachycentridae | | | | | | | | | 2 | 9 | | 57 | 1 | 8 | | 13 | | 1 | | 1 | | 19 | | 10 |
| Glossosomatidae | | | | | | | | | | | | | | | | | | | | | | 2 | | 5 |
| Helicopsychidae | | | | | | | | | | | | | | | 8 | | 2 | | | | 4 | 8 | | 7 |
| Hydroptilidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Hydropsychidae | | | | | 3 | 10 | 2 | 6 | 3 | 7 | | | 7 | 12 | | 10 | 2 | 16 | 21 | 50 | 2 | 5 | 13 | 9 |
| Lepidostomatidae | | | | | | | | | | | | | | | | | | | | | | | 3 | |
| Limnephilidae | | | 2 | | | | | | | | | | 4 | | 9 | | | | 1 | | 1 | | | |
| Philopotamidae | | | | | | | | | | | | | 1 | | | | | | | | 1 | | | |
| Phryganeidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Amphipoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Gammaridae | | 7 | 7 | | 7 | 8 | 1 | 10 | 1 | 3 | 4 | | 3 | 9 | 7 | 4 | | | | | | | 1 | 1 |
| Annelida | | | | | | | | | | | | | | | | | | | | | | | | |
| Hirudinea one family | | 2 | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | |
| Lumbriculidae | | | | | | 1 | | | | | | | | | 1 | | | | | | | | | |
| Arachnida | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| Thrombidiformes one family | | | | | | | | | | | 1 | | | | | | | | | | | | | |
| Decapoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Astacidae | | | | | | | | | | 2 | | | | | | | 2 | 2 | 2 | | 1 | | | |
| Gastropoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Amnicolidae | | | | | 3 | | | | | | | | | | | | | | | | | | | |
| Ancylidae | | | | | | | | | | | | | | | | | | 1 | | | | 5 | 1 | |
| Lymnaeidae | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| Physidae | | 6 | | | 4 | 11 | 2 | 3 | | 1 | | | 1 | 1 | 2 | | 5 | 4 | | | 1 | 4 | 7 | 2 |
| Other | | | | | | | | | | | | | | | | | | | | | | | | |
| Gordioidea | | | | | | | | | | | | | | | | | | | | | | | | |
| Gordiidae | | | | | | | | | | | | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | | | | | | | | | | | | |
| Isopoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Asellidae | 1 | | | | 4 | 3 | | 14 | | | | | | | | | | | | | | | | |
| - | | | | | | | | | | | | | | | | | | | | | | | | |
| Pelecypoda one family | | | | | 2 | | | | | | | | | | | | | | | | | | | |

TABLE 6 - SUMMARY OF MACROINVERTEBRATES COLLECTED AT THE PINE RIVER WATERSHED SAMPLING SITES (CONTINUED)

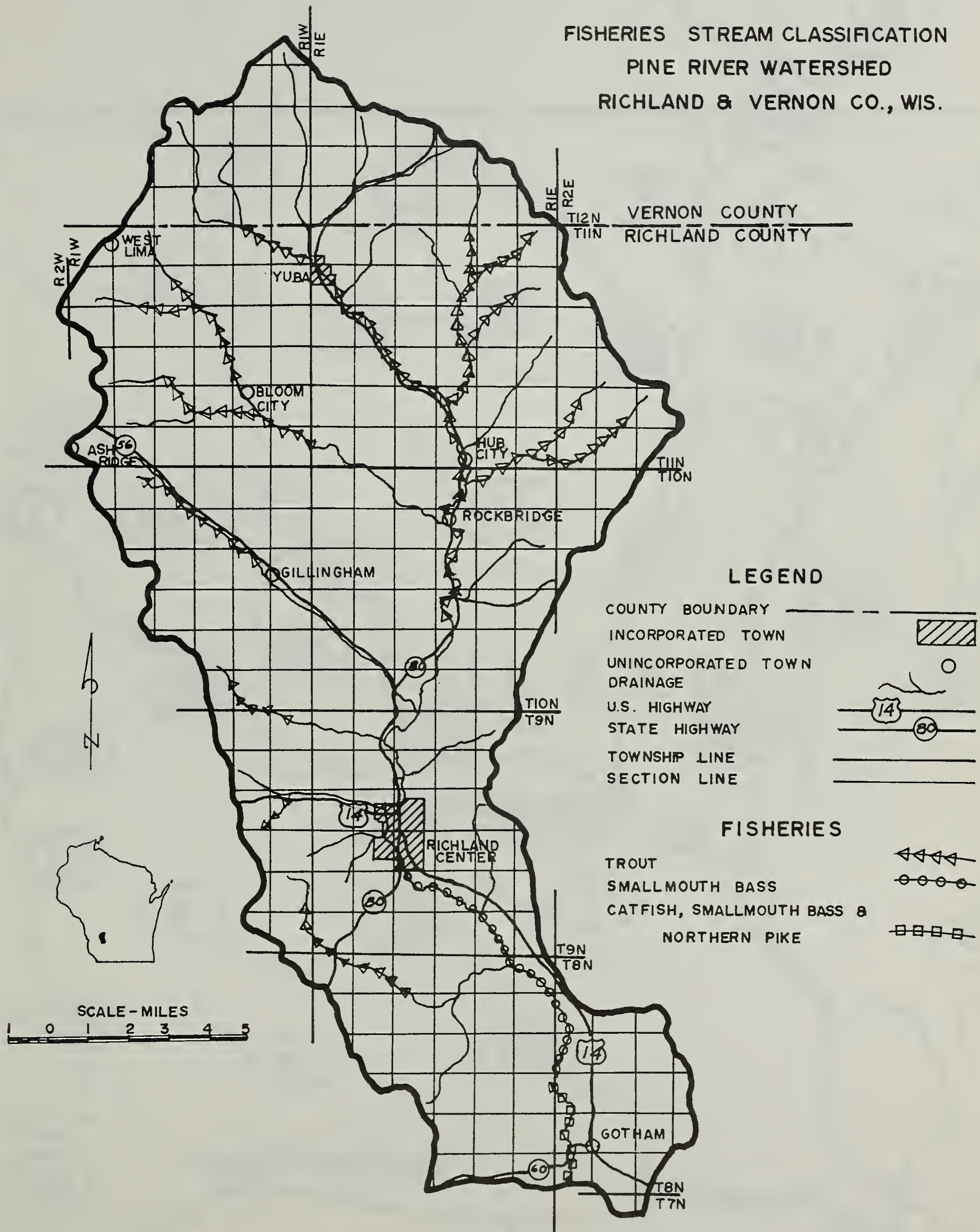
| | Station 11B | | | | Station 14B | | | | Station 21B | | | | Station 32B | | | | Station 33B | | | | Station 36B | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | July 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 | May 1974 | Sept. 1974 | May 1975 | June 1975 |
| Coleoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Dryopidae | | | | | | | | | | 3 | 2 | 3 | | | | | | | 1 | | | | | |
| Dytiscidae | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | |
| Elmidae | 11 | 11 | 8 | 8 | 4 | 4 | | 4 | 17 | 18 | 19 | 15 | | 6 | 2 | 1 | 5 | 6 | 4 | 6 | 2 | 2 | 1 | 3 |
| Gyrinidae | 1 | | | | | | | | | | | | | | | | 3 | | | | 1 | | | |
| Haliplidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Hydrophilidae | | | | 2 | | | | | | | | | | | | | 2 | | | | | | | |
| Diptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Chironomidae | 4 | 6 | 5 | 3 | 2 | 2 | 1 | 3 | 10 | 9 | 15 | 2 | 4 | 6 | 3 | 1 | 12 | 5 | 5 | 2 | 9 | 4 | 5 | |
| Culicidae | 1 | | | | | | | | | | | | | | | | 2 | | | | | | | |
| Dixidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Empedidae | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| Muscidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Phoridae | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| Rhagionidae | 1 | 3 | 1 | | 1 | | | | 2 | 3 | 1 | | | 4 | | 1 | | | | | 2 | 5 | | 1 |
| Simuliidae | 3 | | | 2 | 3 | 2 | 2 | 3 | | 2 | | 5 | 4 | 5 | 5 | 8 | 4 | 9 | | 4 | | | | |
| Stratiomyidae | | | | | | | | | | | | | | | | | 1 | | | | | | | |
| Tipulidae | | 1 | | | | | 1 | | 2 | 2 | | 2 | | 10 | | | | 2 | 1 | | 3 | 1 | 1 | 1 |
| Ephemeroptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Baetidae | 5 | 7 | 11 | 6 | 10 | 19 | 9 | 11 | 10 | 39 | 16 | 13 | 8 | 24 | 32 | 13 | 14 | 9 | 20 | 35 | 23 | 15 | 7 | 53 |
| Baetiscidae | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Coenidae | | | | | | | | | | | | | | 1 | | | | | | | | | | 1 |
| Ephemerellidae | | | | | | | | | 10 | | 6 | 2 | | | | | | | | | 4 | | 18 | |
| Heptageniidae | | | | 1 | 6 | 6 | 3 | 6 | 1 | 4 | 6 | | 1 | 6 | | 2 | | | | | 6 | 5 | 2 | 13 |
| Leptophlebiidae | | | | | | | | | 2 | | 6 | | | | | | | | | | | | | |
| Siphlonuridae | | | | | | | | | | | | | | | | | | | | | 11 | | | |
| Tricorythidae | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Hemiptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Belostomatidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Corixidae | | | | 1 | | | | 1 | | | | | | | | | | | | | | | | |
| Gerridae | | | | 1 | | | | | | | | | | | | | 2 | | | | | | | 1 |
| Pleidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Veliidae | | | 2 | | | | | | | | | | | | | | | | | | | | | |
| Odonata | | | | | | | | | | | | | | | | | | | | | | | | |
| Aeshnidae | 1 | | | 1 | | | | | | | | | | | | | | | | | | | | |
| Calopterygidae | 2 | 2 | | 1 | 1 | 3 | 1 | 1 | 3 | | | | | | | | | | | | 2 | | | |
| Coenagrionidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Gomphidae | | | | | | | | 1 | | | 1 | | | 1 | | | | | | | | 1 | | |
| Plecoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Nemouridae | | | | | | | | | | | | | | | | | | | | | | | | |
| Perlidae | | | | | | | | | | | | | 1 | | | 1 | | | | | 1 | 1 | | 7 |
| Perlodidae | | | | | | | | | 1 | | 6 | | | | | | | | | | | | 3 | |
| Pteronarcidae | | | | | | | | | | | | | | | | | | | | | 1 | 4 | 4 | 5 |
| Trichoptera | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachycentridae | | 1 | | | | | | | 1 | 25 | | 17 | 1 | 8 | | 9 | | 5 | | 2 | | 1 | | |
| Glossosomatidae | | | | | | | | | | 7 | 12 | 1 | | | | | | | | | | | | |
| Helicopsychidae | | | | 21 | | | | | | | | | | | | | | | | | | | | |
| Hydroptilidae | | | | | | | | | | | 3 | | | | | | | | | | | | | |
| Hydropsychidae | 2 | 5 | 19 | | 4 | 10 | 15 | 17 | 7 | 12 | 10 | 8 | 2 | 5 | 1 | 2 | 4 | 14 | 19 | 6 | 7 | 12 | 9 | 10 |
| Lepidostomatidae | | | | | | | | | | | 19 | | | | | | | | | | | | | |
| Limnephilidae | 3 | | | | | | | | 6 | | 9 | 5 | | | | | | | 1 | | 2 | | 1 | |
| Philopotamidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Phryganeidae | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Amphipoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Gammaridae | 1 | 5 | 5 | 4 | 1 | 5 | 5 | 20 | 1 | 2 | 1 | 2 | 1 | 4 | 1 | 2 | 4 | 2 | | 1 | 2 | 3 | 2 | 4 |
| Annelida | | | | | | | | | | | | | | | | | | | | | | | | |
| Hirudinea | | | | | | | | | | | | | | | | | 3 | | 5 | | | | | |
| Lumbriculidae | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| Arachnida | | | | | | | | | | | | | | | | | | | | | | | | |
| Thrombidiformes | | | | | | | | | | | | | | | | | | | | | | | | |
| Decapoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Astacidae | 1 | | | | 1 | 1 | 1 | 3 | | 1 | | 1 | | 3 | | | 2 | | | | 1 | | | 1 |
| Gastropoda | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| Amnicolidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Ancylidae | | | | | | | | | | | | | | 2 | | | | | | | | | | |
| Lymnaeidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Physidae | 2 | 2 | 1 | 1 | | 3 | | | | 6 | 20 | 1 | | | | | 1 | 2 | 5 | 4 | 2 | 2 | | |
| Other | | | | | | | | | | | | | | | | | 2 | | | | | | | |
| Gordioidea | | | | | | | | | | | | | | | | | | | | | | | | |
| Gordiidae | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| Isopoda | | | | | | | | | | | | | | | | | | | | | | | | |
| Asellidae | | | | | | | | | | | | | | | | | | | | | | | | |
| Pelecypoda | | | | | | | | | | | | | | | | | | | | | | | | 2 |

TABLE 7 - DIVERSITY INDEX AND REDUNDANCY OF MACROINVERTEBRATES (22) IN THE PINE RIVER WATERSHED, WISCONSIN

| Station | Date | $\bar{d}$ | r | $\bar{d}_{max}$ | $\bar{d}_{min}$ | mean $\bar{d}$ |
|---|---|---|---|---|---|---|
| 1 | May 1974 | 1.74 | 0.115 | 1.83 | 1.00 | |
| | September 1974 | 2.87 | - .081 | 2.75 | 1.29 | 2.27 |
| | May 1975 | 2.86 | - .004 | 2.87 | 1.49 | |
| | June 1975 | 1.62 | .161 | 1.81 | .62 | |
| 2B | May 1974 | 3.60 | - .018 | 3.56 | 1.50 | |
| | September 1974 | 3.07 | .198 | 3.58 | 1.00 | 2.82 |
| | May 1975 | 1.89 | .506 | 2.82 | .98 | |
| | June 1975 | 2.71 | .228 | 3.28 | .77 | |
| 3 | May 1974 | 3.14 | - .024 | 3.11 | 1.46 | |
| | September 1974 | 2.93 | .009 | 2.95 | 1.32 | 2.41 |
| | May 1975 | 2.58 | .008 | 2.59 | 1.47 | |
| | June 1975 | .98 | .648 | 2.15 | .35 | |
| 4B | May 1974 | 3.43 | .128 | 3.71 | 1.50 | |
| | September 1974 | 3.33 | .197 | 3.90 | 1.01 | 3.14 |
| | May 1975 | 2.71 | .336 | 3.58 | 1.00 | |
| | June 1975 | 3.10 | .212 | 3.66 | 1.03 | |
| 7B | May 1974 | 3.07 | .106 | 3.27 | 1.39 | |
| | September 1974 | 3.12 | .167 | 3.51 | 1.17 | 2.72 |
| | May 1975 | 2.60 | .222 | 3.09 | .90 | |
| | July 1975 | 2.07 | .371 | 2.96 | .57 | |
| 9B | May 1974 | 3.05 | .237 | 3.58 | 1.33 | |
| | September 1974 | 3.23 | .209 | 3.83 | .98 | 2.97 |
| | May 1975 | 2.73 | .248 | 3.32 | .95 | |
| | June 1975 | 2.88 | .095 | 3.09 | .90 | |
| 11B | May 1974 | 3.32 | .130 | 3.56 | 1.71 | |
| | September 1974 | 3.07 | - .056 | 2.97 | 1.20 | 2.96 |
| | May 1975 | 2.56 | .272 | 3.20 | .85 | |
| | June 1975 | 2.88 | .339 | 3.65 | 1.38 | |
| 14B | May 1974 | 2.94 | .006 | 2.95 | 1.32 | |
| | September 1974 | 2.73 | .250 | 3.35 | .88 | 2.74 |
| | May 1975 | 2.47 | .204 | 2.83 | 1.07 | |
| | June 1975 | 2.82 | .184 | 3.26 | .86 | |
| 21B | May 1974 | 3.24 | .101 | 3.49 | 1.08 | |
| | September 1974 | 3.13 | .255 | 3.95 | .73 | 3.30 |
| | May 1975 | 3.68 | .127 | 4.11 | .76 | |
| | June 1975 | 3.17 | .180 | 3.63 | 1.04 | |
| 32B | May 1974 | 2.83 | .052 | 2.90 | 1.62 | |
| | September 1974 | 3.35 | .043 | 3.46 | .96 | 2.56 |
| | May 1975 | 1.41 | .565 | 2.43 | .61 | |
| | July 1975 | 2.66 | .110 | 2.84 | 1.16 | |
| 33B | May 1974 | 3.51 | .163 | 3.92 | 1.40 | |
| | September 1974 | 2.88 | - .036 | 2.81 | .84 | 2.70 |
| | May 1975 | 2.34 | .346 | 3.21 | .68 | |
| | June 1975 | 2.06 | .376 | 2.90 | .68 | |
| 36B | May 1974 | 3.39 | .205 | 3.94 | 1.25 | |
| | September 1974 | 3.14 | .114 | 3.38 | 1.21 | 3.01 |
| | May 1975 | 2.95 | .193 | 3.38 | 1.14 | |
| | June 1975 | 2.56 | .453 | 3.94 | .89 | |

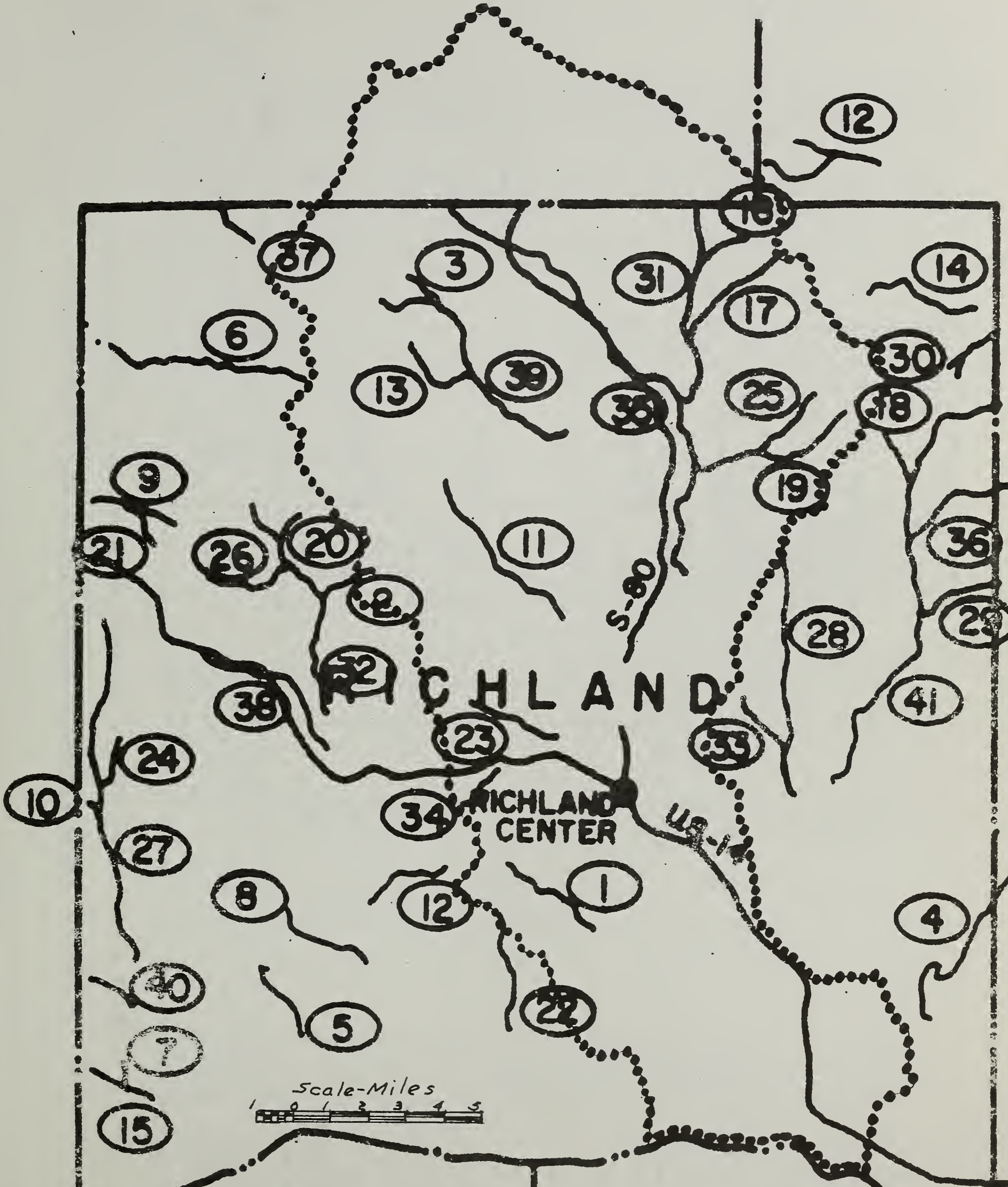
TABLE 8

FISHERIES STREAM CLASSIFICATION
PINE RIVER WATERSHED
RICHLAND & VERNON CO., WIS.




SOURCE:
1970 SURFACE WATER RESOURSES
REPORT OF RICHLAND COUNTY

TABLE 9 - TROUT STREAMS IN RICHLAND COUNTY, WISCONSIN




From "Wisconsin Trout Streams", Wisconsin Department of Natural Resources, 1974 (watershed boundary added).

TABLE 9 - TROUT STREAMS IN RICHLAND COUNTY, WISCONSIN (continued)

(From "Wisconsin Trout Streams", Wisconsin Department of Natural Resources, 1974.)

| NAME OF STREAM | STREAM PORTION TROUT WATERS | TROUT SPECIES | | | CLASS I | | CLASS II | | CLASS III | | Public Lands |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Brook | Brown | Rainbow | Stream Portion | Mi. | Stream Portion | Mi. | Stream Portion | Mi. | |
| **RICHLAND COUNTY (Map 24)** | | | | | | | | | | | |
| 1. Ash Cr | Above CTH "O" bridge in S9, T9N, R1E | n | x | | | | All | 3.8 | | | |
| 2. Babb Hollow Cr | All | | x | | | | All | 1.5 | | | x |
| 3. Basswood Cr | All | x | x | | | | All | 1.5 | | | |
| 4. Bear Cr (Bear Valley Cr) | Above Hwy 130 bridge in S14, T9N, R2E | x | x | x | | | Above S1 | 2.0 | | 3.0 | |
| 5. Byrds Cr | Above Town rd bridge in S25, T9N, R2W | n | x | x | | | All | 4.0 | | | |
| 6. Camp Cr | All | n | n | x | | | All | 5.5 | | | |
| 7. Chitwood Hollow Cr | All | n | x | | | | All | .5 | | | |
| 8. Dieter Hollow Cr | All | x | | | | | All | 2.5 | | | |
| 9. Elk Cr | All | n | n | x | | | All | 2.8 | | | |
| 10. English Run Cr | All | x | x | x | | | All | .1 | | | |
| 11. Fancy Cr | Above CTH "Z" | n | x | x | | | All | 4.6 | | | |
| 12. Fox Hollow Cr | All | n | x | | | | All | 2.5 | | | |
| 13. Gault Hollow Cr | All | x | x | | | | All | 3.9 | | | |
| 14. Germantown Cr (Cazenovia Br) | Above CTH "II" | x | x | x | | | All | 2.5 | | | |
| 15. Gobin Hollow Cr | All | x | x | | | | All | 1.9 | | | |
| 16. Grinsell Br | All | n | x | | | | All | 2.5 | | | |
| 17. Hansel Cr | All | n | x | | | | All | 2.5 | | | |
| 18. Happy Hollow Cr | All | n | x | | | | All | 2.1 | | | |
| 19. Hawkins Cr | All | n | n | x | | | All | 5.4 | | | |
| **RICHLAND COUNTY Cont.** | | | | | | | | | | | |
| 20. Higgins Cr | All | n | | | | | All | 1.8 | | | |
| 21. Hoke Cr | All | n | | | | | All | .7 | | | |
| 22. Hoosier Hollow Cr | Above Hwy 80 in S24, T9N, R1W | x | | x | | | All | 3.5 | | | |
| 23. Horse Cr | Above S6, T10N, R1E | x | | x | | | All | 2.0 | | | |
| 24. Jimtown Br | All | n | x | | | | All | 2.4 | | | |
| 25. Johnston Cr | All | x | | x | | | All | 2.2 | | | |
| 26. Kepler Br | All | | x | | | | All | 1.5 | | | |
| 27. Knapp Cr | Above CTH "U" S6, T9N, R2W | x | x | x | | | All | 8.7 | | | x |
| 28. Little Willow Cr | All | x | x | | | | Above S31 | 2.0 | | 5.5 | |
| 29. Lost Hollow Cr | All | n | x | | | | All | 2.4 | | | |
| 30. McGlynn Cr | Above Hwy 58 | x | n | x | | | All | 3.0 | | | |
| 31. Melancthon Cr | All | n | n | x | | | All | 5.4 | | | |
| 32. Mill Cr | Above border at S1 6, T10N, R2 & 1 W | x | n | x | | | All | 7.0 | | | |
| 33. Misslich Cr | All | n | | | | | All | 1.6 | | | |
| 34. Pier Spring Cr | All | n | | | | | All | 1.1 | | | |
| 35. Pine R (Pine Cr—Yuba Br) | Above Hwy 80 at Buck Cr | | x | x | | | Above Hub City | 9.0 | | 5.0 | x |
| 36. Smith Hollow Cr | All | x | n | x | | | All | 3.0 | | | |
| 37. S Bear Cr | All | x | x | | | | All | 1.6 | | | |
| 38. W Br Mill Cr (Mill Cr—Bosstown Br) | Above CTH "KK" | x | x | x | | | All | 3.8 | | | |
| 39. W Br Pine R (Pine Cr—Bloom City Br) | Above Woodstock | | x | x | | | All | 3.8 | | | |
| 40. W Fk Knapp Cr | All | x | x | x | | | All | 1.5 | | | |
| 41. Willow Cr | Above Ithaca Dam | x | n | x | S27 | 2.0 | | 10.5 | | | x |

APPENDIX D

Wisconsin Scientific Areas Preservation Council. Scientific or Natural Area Report.

FORM 2800-8 Scientific Area No. ________

Wisconsin Scientific Areas Preservation Council
Scientific or Natural Area Report

Name of Area *Kalcevavek Oak Forest* Inspection Date *27 June 75*

Quarter *SW* County *Richland* Twsp. *12N* Range *1E* Sections *SW 1/4 SW 1/4 22*

Boundaries and acreage of proposed or established area and buffer: *SW SW 22 area inspected. Woods extends northward some 2 miles along ridge tops.*

Access to area: *across private lands for 3/4 mile northward from CTH C*

Description of area: Outstanding features, primary and secondary biotic communities, dominants, understory and rare species, topography, soils; geology and archeology.

*An extensive upland forest of oak-maple with a variety of overstory trees - red oak, sugar maple, Am. elm (all three with individuals to 20" DBH) and other species such as ironwood, w. ash, big-toothed aspen, black cherry and basswood. Rare white pine 8-12" occur. The forest occupies north, west and south facing slopes. Bedrock is sandstone and near the summit the caprock (dolomite) [illegible]. Moderate sized dolomite rocks occur on the summit - walking fern on the rocks. A fence separates this woods in section 22 from the one currently grazed in Section 27 NW 1/4 NW 1/4.*
*The understory is rather rich - without weeds - with little disturbance obvious. Over 100 total species recorded. See attached plant species list.*
*Development plans should include no more than hiking trails for this area. More disturbed woods or grazed areas can be more heavily developed.*

History of land use and limiting factors: *Except for sporadic, recent cutting at the summit, no other cutting evident.*

Administrative information: Landowner and administrator, existing and proposed management, degree of scientific, educational and recreational use of area, adjacent lands and compatibility.
*Privately owned; within the acquisition boundary for structure 36, one of 7 structures for flood control proposed for the Pine River Watershed by SCS. The recreation pool elevation = 830; flood pool = 850. Only a few acres at SW corner would be affected.*

Reference information: person recommending area, references, quadrangle and other publications and date of action taken toward designation of area.
*[illegible] Hillsboro Quadrangle*

Report by: *William Tans* Date: *3 July 75*

mr
2/27/74

*(See over)*

(2)
Also field checked low sandstone (nearly vertical) cliffs along Pine River in NW¼ NW¼ 27 just south of the woods discussed on front. The area is now pastured - with little natural area value except on the cliffs. Sandstone cliffs are wet, and have wet, seepage slopes above them, where these plants on the edge of the woods were observed:

Alnus rugosa
Aster prenanthoides

Cystopteris fragilis
C. bulbifera
Cardamine bulbosa
Caltha palustris
Cicuta maculata
Eupatorium perfoliatum
Galium asperllum
Hydrocotyle americana
Impatiens capensis

Rhus radicans
Saxifraga (pensylvanica?)
Symplocarpus foetidus
Smilacina stellata
Thalictrum dasycarpum

Ribes americanum
Rudbeckia laciniata
Senecio (aureus?)
Heuchera richardsonia

on wet cliffs:
Sullivantia renifolia
Potentilla fruticosa
Liverworts: Marchantia, Conocephalum

A somewhat unique assembledge of "perched" wetland species above a cliff, maintained by water seeping out of the rock strata. Water may be somewhat calcareous from percolating through dolomite. It is unusual to see Potentilla fruticosa on cliffs, it being an open, calcareous wetland plant. Sullivantia is a driftless area endemic.

---

(3) A third area briefly inspected: low cliffs along the Pine River in NW¼ 20 at Norman Valley: small area of sugar maple forest - degraded but with Orchis spectabilis, and low sandstone cliffs 6-8' tall. Much of area grazed.

In damp woods: Chelidonium majus in NE¼ NW¼ 20, Poppy family, of European origin.

SOUTHERN UPLAND FOREST PLANT SPECIES LIST

Dry-mesic and Mesic Forests

LEGEND - a rating of approximate frequency

- A - Abundant, the dominant vegetation
- C - Common, locally abundant or frequent
- O - Occasional, infrequently encountered
- R - Rare, very few individuals seen

Name of Area: Kaderavek Oak-Maple Forest

T 12 N R 1E Section SW 1/4 SW 1/4 22

County Richland Size ± 60 acres

HERBACEOUS PLANTS

- Actaea alba
- Actaea rubra
- ✓ Adiantum pedatum
- Agastache scrophulariaefolia
- ✓ Agrimonia gryposepala
- Agrimonia pubescens
- Allairia officinalis
- Allium canadense
- ✓ Allium tricoccum
- ✓ Anemone quinquefolia
- ✓ Anemone virginiana
- Anemonella thalictroides
- ✓ Aplectrum hyemale
- ✓ Aquilegia canadensis
- Arabis canadensis
- ✓ Arabis laevigata
- ✓ Aralia nudicaulis
- ✓ Aralia racemosa
- Arenaria lateriflora
- Arisaema triphyllum
- Asarum canadensis
- Asclepias exaltata
- Aster lateriflorus
- ✓ Aster macrophyllus
- ✓ Aster prenanthoides
- ✓ Aster sagittifolius
- ✓ Aster shortii
- ✓ Athyrium felix-femina
- Blephila hirsuta
- ✓ Botrychium virginianum
- ✓ Brachyelytrum erectum
- ✓ Bromus purgans
- Campanula americana
- Cardamine bulbosa
- Cardamine douglassii
- Carex albursina
- Carex amphibola
- ✓ Carex blanda
- Carex cephalophora
- ✓ Carex convoluta
- Carex gracillima
- ✓ Carex hirtifolia
- Carex jamesii
- Carex laxiflora
- Carex pensylvanica
- Carex plantaginea
- Carex rosea
- Carex sparganoides
- Carex woodii
- ✓ Caulophyllum thalictroides
- Cinna arundinacea
- Cinna latifolia
- ✓ Circaea quadrisulcata
- Cirsium altissimum
- Claytonia virginiana
- ✓ Conopholis americana
- Corallorhiza maculata
- ✓ Cryptotaenia canadensis
- Cypripedium pubescens
- ✓ Cystopteris fragilis
- Dentaria laciniata
- Desmodium cuspidatum
- ✓ Desmodium glutinosum
- Desmodium nudiflorum
- Dicentra cucullaria
- ✓ Dioscorea villosa
- Dryopteris goldiana
- Dryopteris spinulosa
- Elymus villosus
- Epifagus virginiana
- Erythronium albidum
- Erythronium americanum
- ✓ Eupatorium purpureum
- ✓ Eupatorium rugosum
- ✓ Festuca obtusa
- Floerkea proserpinacoides
- Fragaria vesca
- ✓ Fragaria virginiana
- ✓ Geranium maculatum
- ✓ Galium aparine
- ✓ Galium circaezans
- ✓ Galium concinnum
- Galium lanceolatum
- ✓ Galium triflorum
- ✓ Geum canadense
- Geum ____________
- Goodyera pubescens
- Habenaria viridis
- Hackelia americana
- Hackelia virginiana
- Helianthus decapetalus
- ✓ Helianthus strumosus
- Hepatica acutiloba
- Hepatica americana
- Hydrastis canadensis
- Hydrophyllum appendiculatum
- Hydrophyllum virginianum
- Hystrix patula
- ✓ Impatiens capensis
- Impatiens pallida
- Isopyrum biternatum
- Jeffersonia diphylla
- Lactuca biennis
- Lactuca floridana
- ✓ Laportea canadensis
- Lathyrus ochroleucus
- Leersia virginica
- Lithospermum latifolium
- Luzula acuminata
- Luzula multiflora
- Lycopodium clavatum
- Lycopodium complanatum
- Lycopodium lucidulum
- Lycopodium obscurum
- Maianthemum canadense
- ✓ Milium effusum
- Mitella diphylla
- Monotropa uniflora
- Orchis spectabilis
- Oryzopsis racemosa
- ✓ Osmorhiza claytoni
- ✓ Osmorhiza longistylis
- Osmunda cinnamomea
- Osmunda claytoniana
- ✓ Panax quinquefolius
- ✓ Panicum latifolium
- ✓ Parietaria pensylvanica
- Phlox divaricata
- ✓ Phryma leptostachya
- ✓ Podophyllum peltatum
- ✓ Polemonium reptans
- Polygonatum canaliculatum
- ✓ Polygonatum pubescens
- Potentilla simplex
- ✓ Prenanthes alba
- Prunella vulgaris lan.
- ✓ Pyrola elliptica
- Pyrola rotundifolia
- ✓ Ranunculus abortivus
- ✓ Ranunculus recurvatus
- Ranunculus septentrionalis
- ✓ Sanguinaria canadensis
- ✓ Sanicula gregaria
- ✓ Sanicula marilandica
- Scutellaria ovata versi.
- Silene stellata
- ✓ Smilacina racemosa
- ✓ Solidago flexicaulis
- ✓ Solidago ulmifolia
- Solidago ____________
- Streptopus roseus
- ✓ Symplocarpus foetidus
- Taenidia integerrima
- Thalictrum dioicum
- Tovara virginiana
- Trientalis borealis
- Trillium cernuum
- Trillium gleasoni
- Trillium grandiflorum
- Trillium nivale
- Trillium recurvatum
- ✓ Triosteum aurantiacum
- Triosteum perfoliatum
- ✓ Uvularia grandiflora
- Uvularia sessilifolia
- ✓ Veronicastrum virginicum
- Vicia caroliniana
- Viola conspersa
- Viola cucullata
- Viola incognita
- Viola pubescens
- Viola sororia

SOUTHERN UPLAND FOREST PLANT SPECIES LIST

## TREES, SHRUBS AND VINES

- ✓ Acer rubrum
- ✓ Acer saccharum
- Acer spicatum
- ✓ Amelanchier ____
- ✓ Amphicarpa bracteata
- Betula alleghaniensis
- Betula papyrifera
- ✓ Carpinus caroliniana
- ✓ Carya cordiformis
- Carya ovata
- Celastris scandens
- Celtis occidentalis
- ✓ Cornus alternifolia
- Cornus racemosa
- ✓ Cornus rugosa
- ✓ Corylus americana
- ✓ Crataegus ____
- Dirca palustris
- Euonymus atropurpureus
- Fagus grandifolia
- ✓ Fraxinus americana
- Fraxinus pennsylvanica
- Fraxinus penn. subinteg.
- Fraxinus quadrangulata
- Gymnocladus dioica
- Hamamelis virginia
- ✓ Juglans cinerea
- Juglans nigra
- ✓ Lonicera ~~dioica~~ sp.
- Lonicera prolifera
- ✓ Menispermum canadense
- ✓ Ostrya virginiana
- ✓ Parthenocissus inserta
- Parthenocissus quinquefolia
- ✓ Populus grandidentata
- Populus tremuloides
- ✓ Prunus serotina
- ✓ Prunus virginiana
- ✓ Quercus alba
- Quercus macrocarpa
- ✓ Quercus rubra
- ✓ Quercus velutina
- ✓ Rhus radicans
- Ribes americanum
- ✓ Ribes cynosbati
- Ribes missouriense
- ✓ Rubus alleghaniensis
- Rubus occidentalis
- Rubus strigosus
- Rubus ____
- Sambucus canadensis
- Sambucus pubens
- ✓ Smilax ecirrhata
- ✓ Smilax hispida
- ✓ Smilax lasioneura
- Staphylea trifolia
- Taxus canadensis
- ✓ Tilia americana
- Tsuga canadensis
- ✓ Ulmus americana
- Ulmus rubra
- Ulmus thomasi
- ✓ Viburnum acerifolium
- Viburnum lentago
- ✓ Viburnum rafinesquianum
- Vitis aestivalis
- ✓ Vitis riparia
- ✓ Xanthoxylum americanum

ADDITIONAL SPECIES AND COMMENTS:

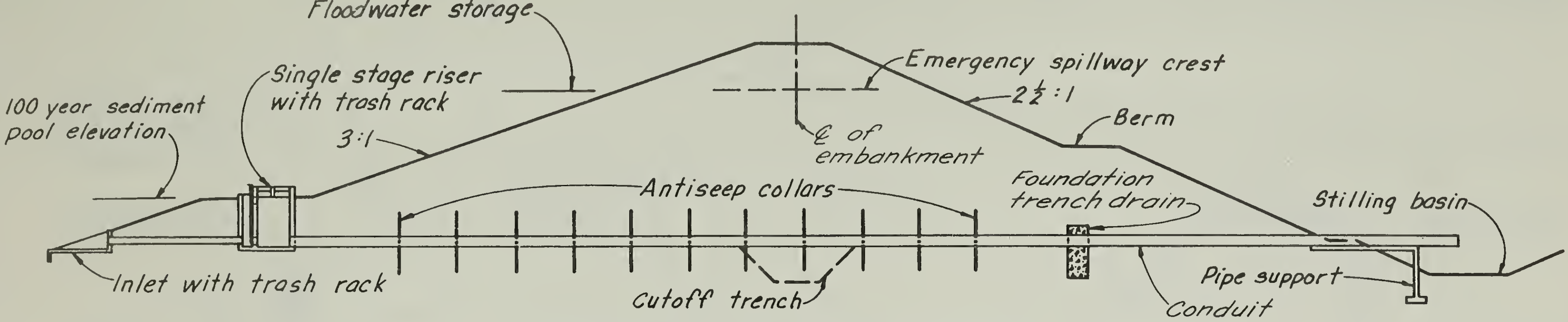
✓ Pinus strobus

Apocynum androsaemifolium
Lysimachia quadrifolia
Scrophularia sp.
Camptosorus - rhizophyllus - walking fern
Zizia aurea

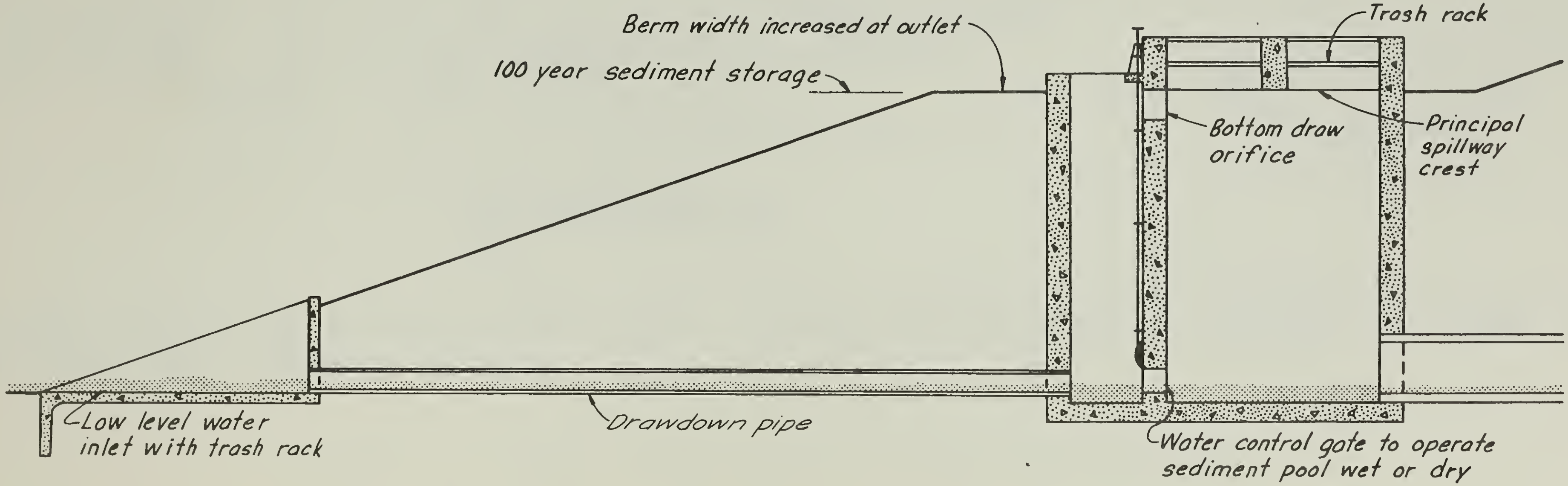
Observer W. Tans Date 27 June 7

# APPENDIX E

# FIGURE 1 - TYPICAL FLOODWATER RETARDING STRUCTURE



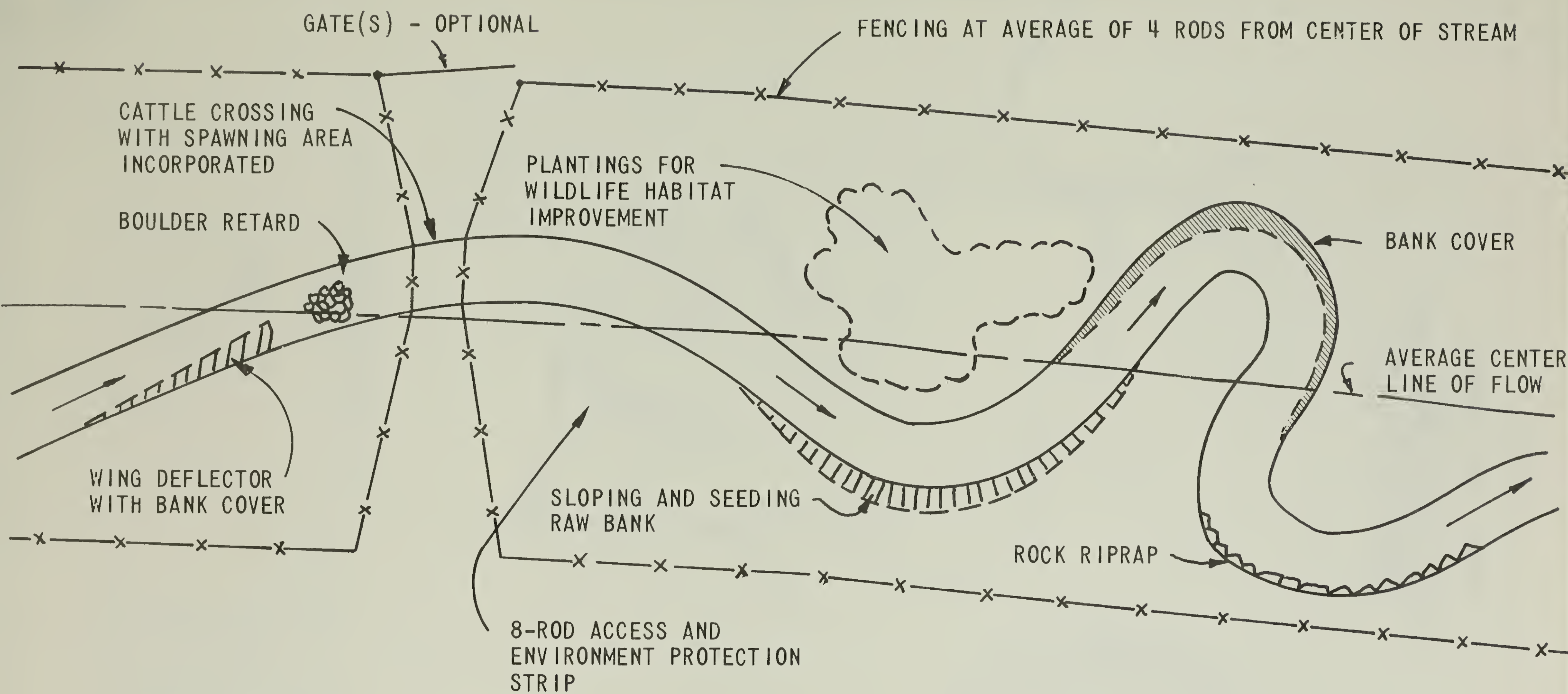

CROSS SECTION ON CENTERLINE




INLET WORKS SHOWING WET OR DRY SEDIMENT POOL OPERATION

2-26-73
5,N-31,422

USDA SCS LINCOLN NEBR 197?



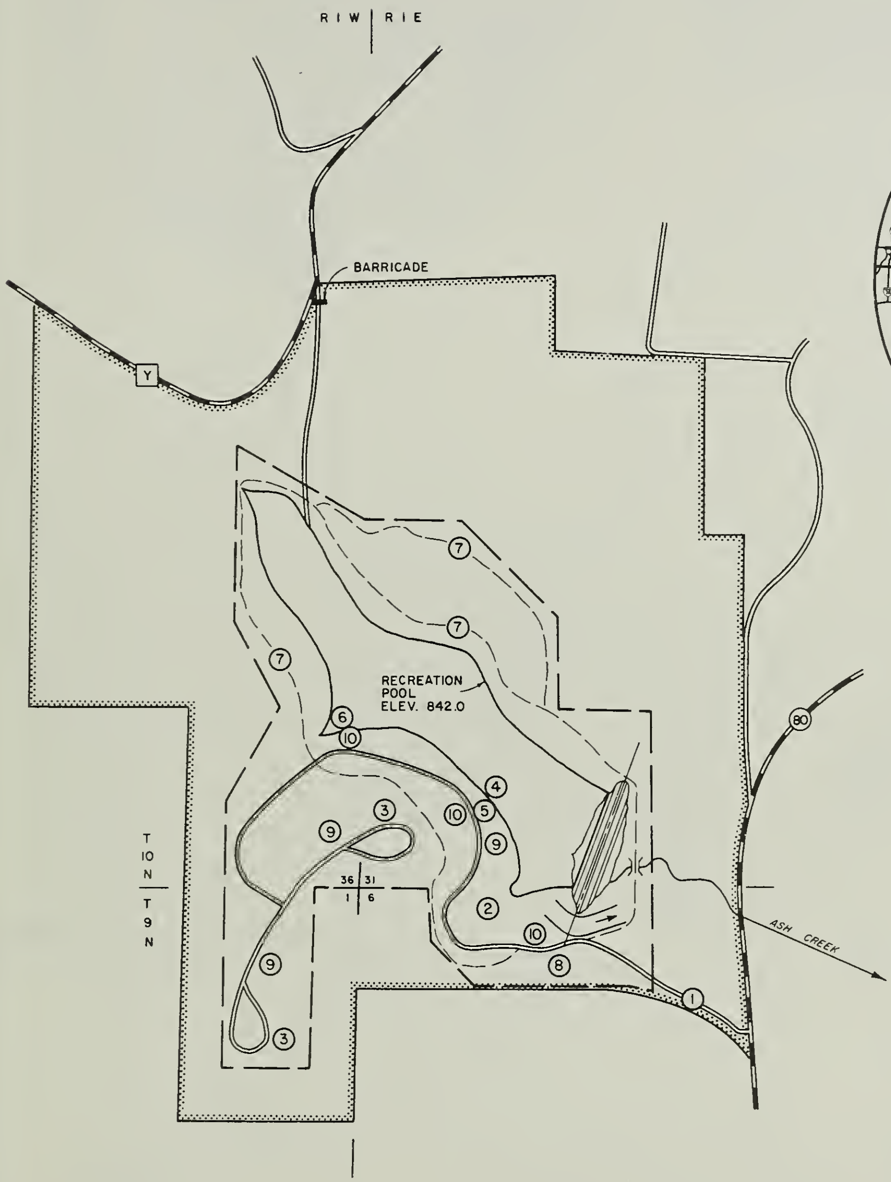

THIS SKETCH SHOWS TYPICAL STREAM IMPROVEMENT FEATURES, INCLUDING INSTREAM DEVICES FOR IMPROVEMENT OF FISH HABITAT, STREAMBANK STABILIZATION FOR IMPROVING WATER QUALITY, PLANTINGS FOR WILDLIFE HABITAT IMPROVEMENT, AND FENCING FOR PUBLIC ACCESS AND ENVIRONMENTAL PROTECTION.

FIGURE 1A - TROUT STREAM HABITAT IMPROVEMENT FEATURES

FIGURE 2

# CONCEPTUAL PLAN

## STRUCTURE SITE 2
## PUBLIC RECREATION DEVELOPMENT
## PINE RIVER WATERSHED
## RICHLAND COUNTY, WISCONSIN





AREA WITHIN 150 MILE RADIUS

1 / 18,100

SCALE 660 0 660 1320 1980 FEET

WISCONSIN

LEGEND

- ① GATEHOUSE
- ② PICNIC AREA
- ③ TRAILER AND TENT CAMPING
- ④ SAND BEACH
- ⑤ BEACH HOUSE
- ⑥ BOAT LAUNCHING RAMP
- ⑦ NATURE AND HIKING TRAIL
- ⑧ PARK HEADQUARTERS
- ⑨ TOILETS
- ⑩ PARKING
- — — P.L.-566 COST SHARING BOUNDARY
- ........ PARK BOUNDARY

SOURCE
MATERIAL SUBMITTED BY FIELD

11-14-75
5,P-35,457

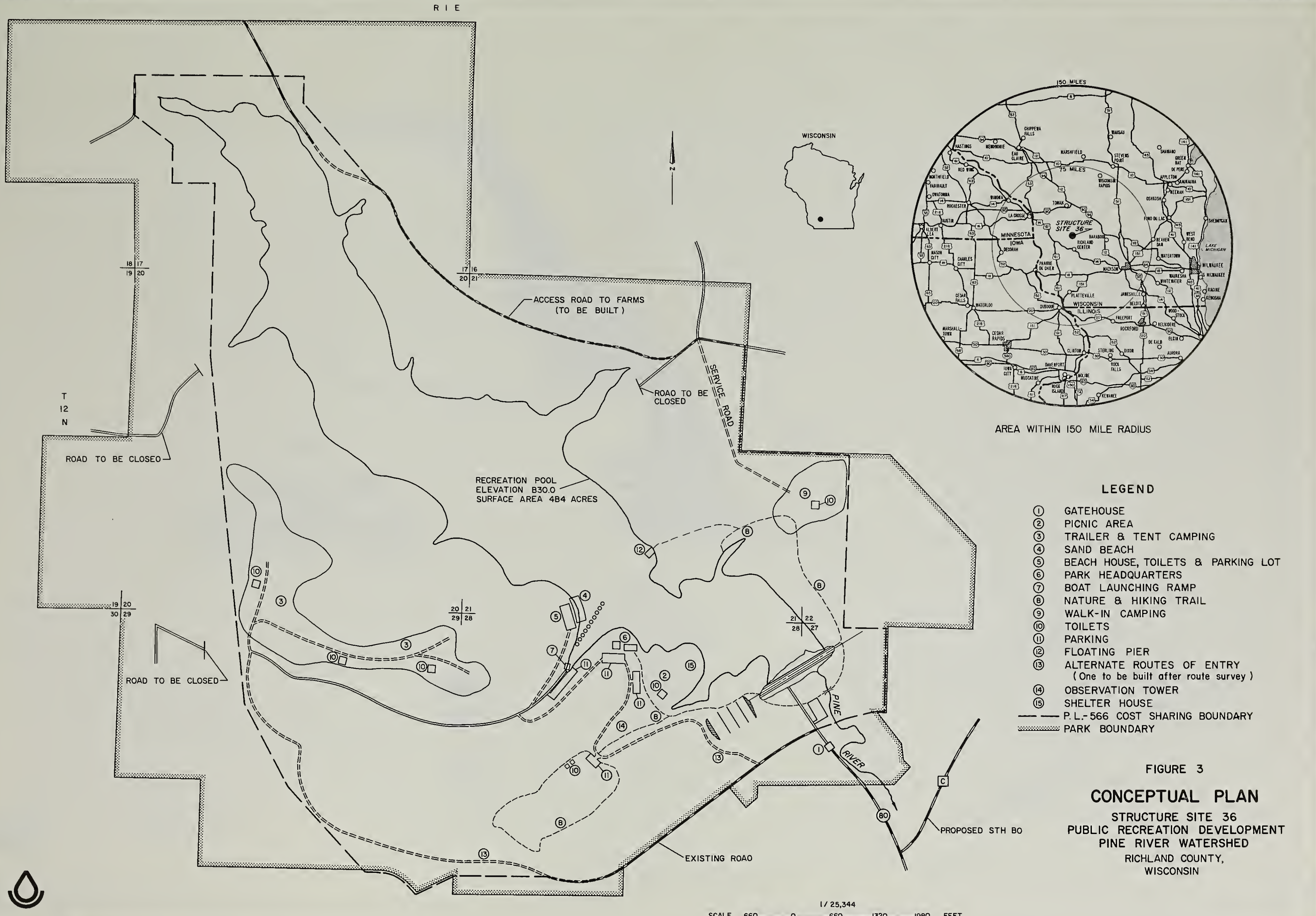



FIGURE 3

## CONCEPTUAL PLAN

STRUCTURE SITE 36
PUBLIC RECREATION DEVELOPMENT
PINE RIVER WATERSHED
RICHLAND COUNTY,
WISCONSIN

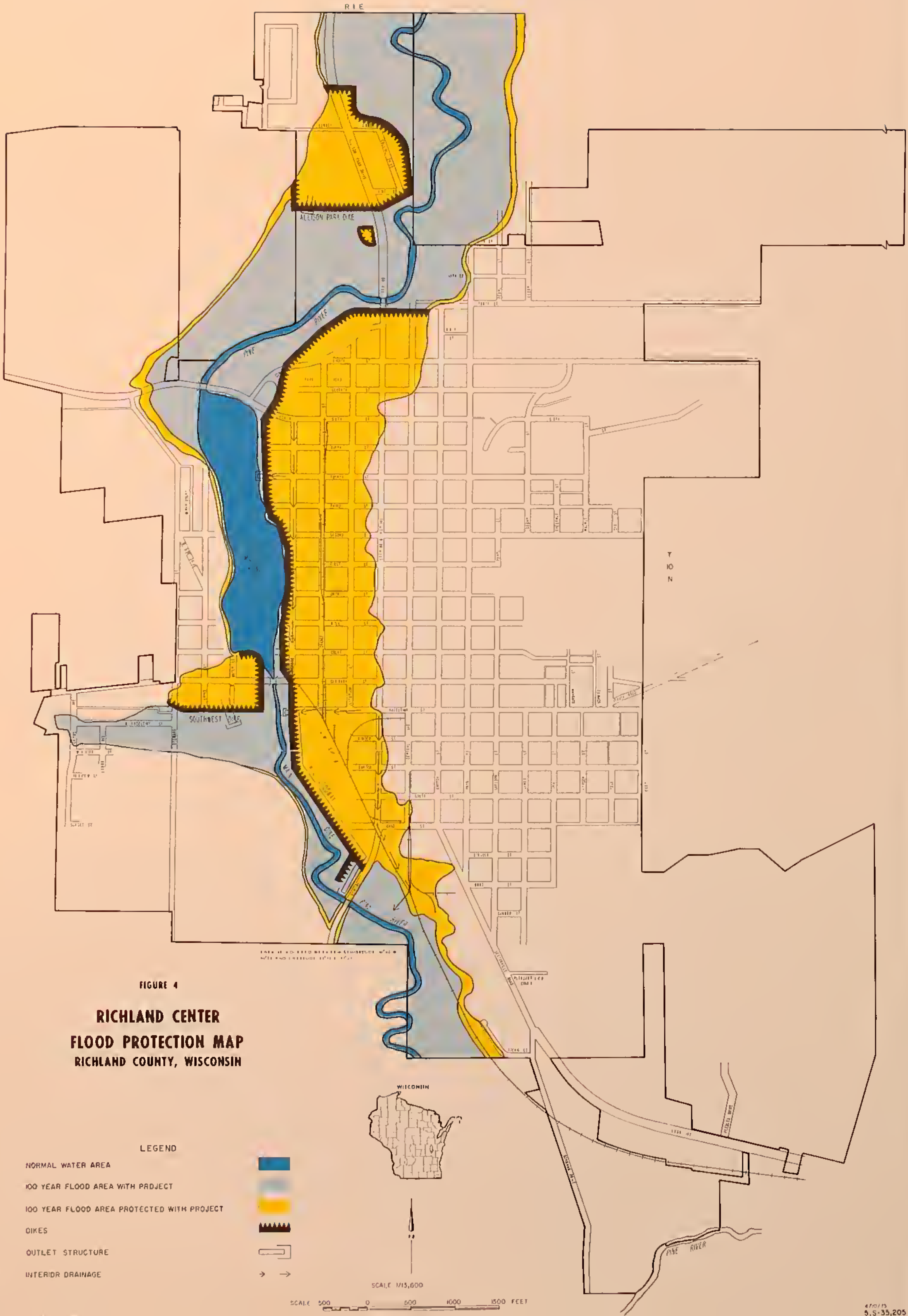



FIGURE 4

**RICHLAND CENTER**
**FLOOD PROTECTION MAP**
**RICHLAND COUNTY, WISCONSIN**

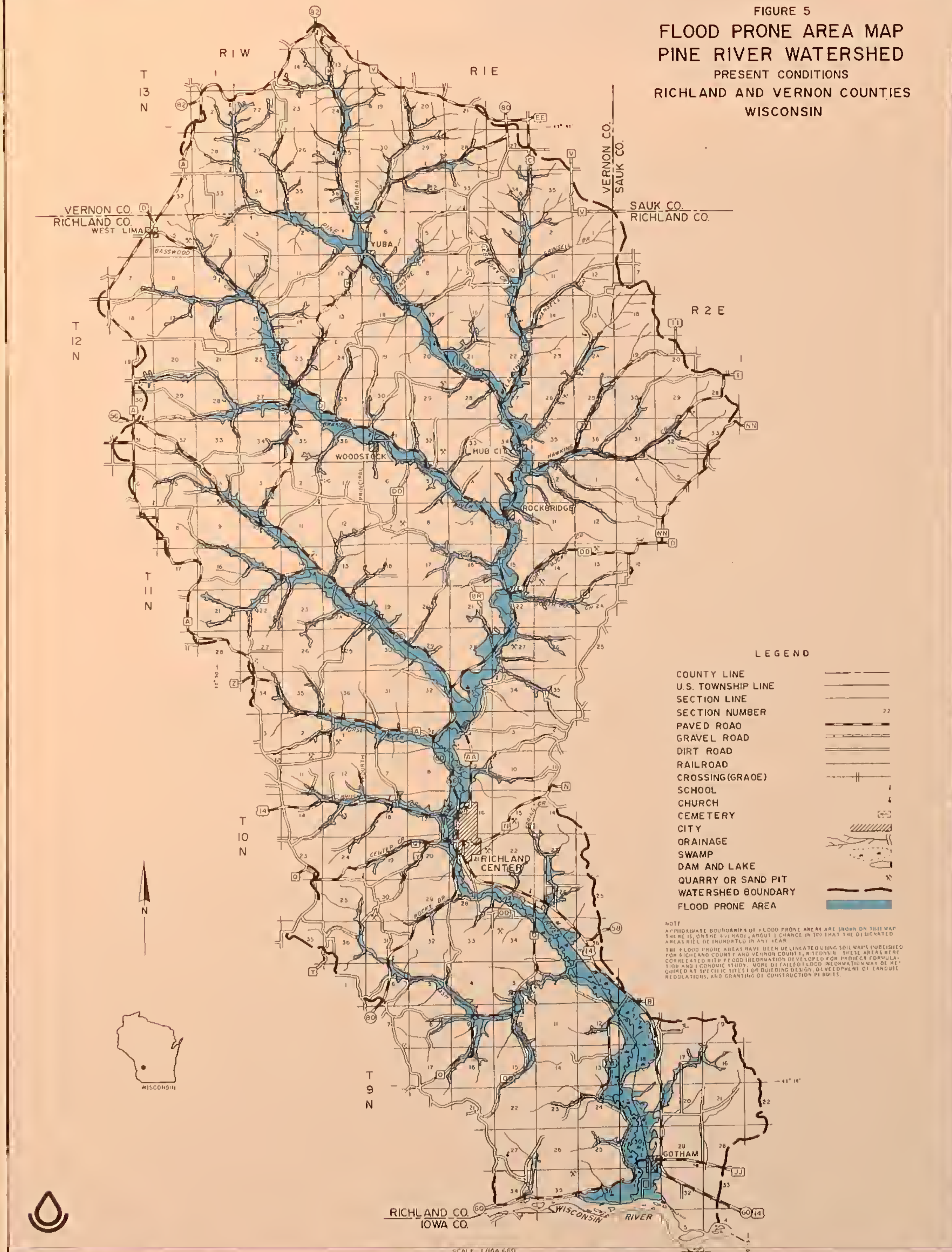
FIGURE 5

# FLOOD PRONE AREA MAP
# PINE RIVER WATERSHED

PRESENT CONDITIONS

RICHLAND AND VERNON COUNTIES

WISCONSIN




NOTE

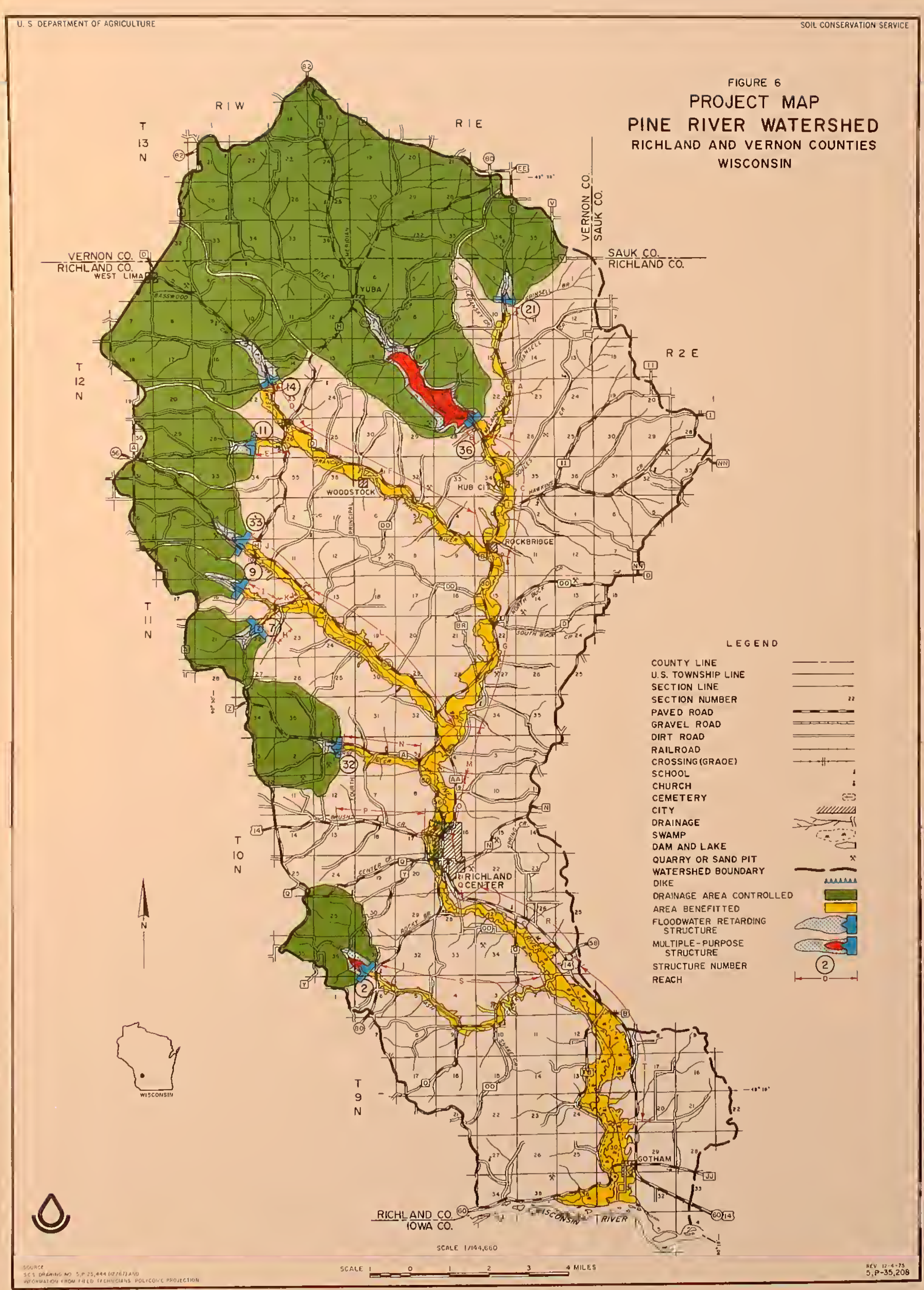
APPROXIMATE BOUNDARIES OF FLOOD PRONE AREAS ARE SHOWN ON THIS MAP. THERE IS, ON THE AVERAGE, ABOUT 1 CHANCE IN 100 THAT THE DESIGNATED AREAS WILL BE INUNDATED IN ANY YEAR.

THE FLOOD PRONE AREAS HAVE BEEN DELINEATED USING SOIL MAPS PUBLISHED FOR RICHLAND COUNTY AND VERNON COUNTY, WISCONSIN. THESE AREAS WERE CORRELATED WITH FLOOD INFORMATION DEVELOPED FOR PROJECT FORMULATION AND ECONOMIC STUDY. MORE DETAILED FLOOD INFORMATION MAY BE REQUIRED AT SPECIFIC SITES FOR BUILDING DESIGN, DEVELOPMENT OF LANDUSE REGULATIONS, AND GRANTING OF CONSTRUCTION PERMITS.

SOURCE
S.C.S. DRAWING NO. 5,P-25,444 (12/67) AND INFORMATION FROM FIELD TECHNICIANS. POLYCONIC PROJECTION

SCALE 1 0 1 2 3 4 MILES

4/22/75
5,P-35,209


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FIGURE 6
PROJECT MAP
PINE RIVER WATERSHED
RICHLAND AND VERNON COUNTIES
WISCONSIN
VERNON CO.
RICHLAND CO.
SAUK CO.
WEST LIMA
YUBA
WOODSTOCK
HUB CITY
ROCKBRIDGE
RICHLAND CENTER
GOTHAM
RICHLAND CO.
IOWA CO.
WISCONSIN RIVER
R I W
R I E
R 2 E
T 13 N
T 12 N
T 11 N
T 10 N
T 9 N
LEGEND
COUNTY LINE
U.S. TOWNSHIP LINE
SECTION LINE
SECTION NUMBER
PAVED ROAD
GRAVEL ROAD
DIRT ROAD
RAILROAD
CROSSING (GRADE)
SCHOOL
CHURCH
CEMETERY
CITY
DRAINAGE
SWAMP
DAM AND LAKE
QUARRY OR SAND PIT
WATERSHED BOUNDARY
DIKE
DRAINAGE AREA CONTROLLED
AREA BENEFITTED
FLOODWATER RETARDING STRUCTURE
MULTIPLE-PURPOSE STRUCTURE
STRUCTURE NUMBER
REACH
WISCONSIN
SCALE 1/144,660
SCALE 1 0 1 2 3 4 MILES
REV 12-4-73
5,P-35,208

SOIL CONSERVATION SERVICE